DRAFT

RCRA FACILITY INVESTIGATION (RFI)
PHASE IV REPORT
CLEAN HARBORS (WICHITA) FACILITY
2549 NEW YORK AVENUE
WICHITA, KANSAS

EPA IDENTIFICATION NO KSD007246846

VOLUME 2 OF 2
APPENDIX G

Prepared by:

Cameron-Cole

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JULY 24, 2014

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Volume 2 of 2
Appendix G

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July 24, 2014

APPENDIX G

HUMAN HEALTH RISK ASSESSMENT, RBR CONSULTING

Risk-Based Remedies

RBR Consulting, Inc.

HEALTH RISK ASSESSMENT

FOR THE

CLEAN HARBORS KANSAS LLC PROPERTY
WICHITA, KANSAS

Prepared for:

Cameron-Cole LLC
Boulder, Colorado

Prepared By:

Risk-Based Remedies
RBR Consulting, Inc.

February 2014

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EXECUTIVE SUMMARY

This risk assessment report has been prepared by RBR Consulting Inc. (RBR) on behalf of Cameron-Cole, LLC, for the Clean Harbors Kansas, LLC site located in Wichita, Kansas. This assessment was conducted in a manner consistent with standard and customary approaches specified by the United States Environmental Protection Agency (USEPA). Clean Harbors Kansas, LLC is performing corrective action activities at the site under the USEPA's Resource Conservation and Recovery Act (RCRA).

The Clean Harbors site has been used for manufacturing and/or chemical waste handling for approximately 60 years. The site is comprised of several solid waste management units (SWMUs), areas of concern (AOCs), and other areas (OAs) that were the focus of several RCRA facility investigations. The site lies within the North Industrial Corridor (NIC), which includes most of the industrial corridor near the facility. The NIC, which includes over 4,000 acres of property, has been identified as having a dissolved groundwater plume of chlorinated volatile organic compounds (VOCs) present.

For purposes of the risk assessment, the onsite portion of the facility was divided into three discrete exposure areas: the Western Area, Central Area, and Eastern Area. Soil and groundwater data from each of the three onsite risk assessment exposure areas were evaluated in order to identify constituents of interest (COI). An evaluation of upgradient and downgradient groundwater and sediment and surface water data from the East Fork of Chisholm Creek was also conducted. In addition, an evaluation of indoor air and soil gas data collected from Building E, located in the Central Area of the site, was included in the assessment.

Direct contact COI for soil of the Western Area consist of: tetrachloroethene, trichloroethene and arsenic. Direct contact COI for soil of the Central Area consist of: 1,2,4-trimethylbenzene, ethylbenzene, naphthalene, tetrachloroethene, total xylenes, trichloroethene, vinyl chloride, benzo(a) pyrene, MCPP, toxaphene, arsenic and lead. Direct contact COI for soil of the Eastern Area consist of: 1,2,4-trimethylbenzene, ethylbenzene, naphthalene, tetrachloroethene, total xylenes, trichloroethene, vinyl chloride, benzo(a)pyrene, arsenic and lead. COI were also identified for the soil migration to groundwater pathway for each of the three areas. These COI consisted of several VOCs, SVOCs, herbicides and pesticides and inorganics.

The COI for shallow and deep groundwater zones from the onsite and downgradient areas include: 1,1-dichloroethane, 1,2,4-trimethylbenzene, 1,2-dichloroethane, 1,3,5-trimethylbenzene, benzene, chloroform, cis-1,2-dichloroethene, ethylbenzene, isopropylbenzene, m&p-xylenes, methylene chloride, naphthalene, n-propylbenzene, o-xylene, tetrachloroethene, toluene, total xylenes, trichloroethene, vinyl chloride, 1-methylnaphthalene, mercury (total), lead (total), arsenic (total & dissolved), barium (total & dissolved), iron (total & dissolved), and manganese (total & dissolved). In addition, COI identified for

upgradient groundwater from the shallow and deep zones include: benzene, carbon tetrachloride, chloroform, cis-1,2-dichloroethene, naphthalene, tetrachloroethene and trichloroethene. The COI identification process was conducted for upgradient groundwater in order to provide information on constituents that could be migrating onsite from upgradient sources within the NIC.

COI for vapor intrusion from onsite shallow groundwater consist of 1,1-dichloroethane, ethylbenzene, tetrachloroethene, trichloroethene and vinyl chloride. 1,2,4-Trimethylbenzene was identified as a COI for indoor air (air concentrations were directly measured from two locations inside Building E). No constituents were detected in soil gas samples from Building E above the screening values, therefore no further evaluation of constituents in soil gas is warranted. Finally, the COI identified for sediment from the East Fork of Chisholm Creek consist of: benzo(a)pyrene, arsenic and lead. No COI were identified for surface water from the East Fork of Chisholm Creek.

The Clean Harbors site is an active industrial facility, and future use is expected to remain industrial. An ordinance is in place which prohibits installation of groundwater wells for personal use in the vicinity of the site. As stated previously, the site was divided into three discrete onsite exposure areas: the Western Area, Central Area, and Eastern Area. Current and future onsite outdoor workers, construction workers, and indoor workers were considered as potential human receptors in each of these three areas. The outdoor worker and construction worker were assessed for incidental ingestion of soil, dermal contact with soil, and inhalation of volatile emissions and airborne particulates associated with wind erosion. The indoor worker was assessed for potential indoor air inhalation exposures for volatiles that could enter a future building from shallow groundwater (vapor intrusion). In addition, a recreational adult and youth were evaluated for potential exposure to COI in sediment from the East Fork of Chisholm Creek via incidental ingestion and dermal contact.

It is assumed that groundwater use restrictions will be placed on the site to prevent lifetime drinking water ingestion. As noted above, currently, concentrations of several constituents in groundwater exceed drinking water standards, indicating that should a risk assessment for a hypothetical lifetime groundwater ingestion scenario be conducted, the results would indicate unacceptable potential risk for this hypothetical future exposure pathway.

Exposure point concentrations for COI in each area and medium were either statistically calculated based on the analytical data, or were modeled using USEPA fate and transport equations. For the toxicity assessment, toxicity values for the COI were derived from the USEPA Integrated Risk Information System (IRIS) database and other relevant USEPA sources as needed. Exposure to lead in soil and sediment was addressed using a model specific to non-residential receptors developed by the USEPA Technical Review Workgroup for Lead.

The risk characterization was conducted for each potential receptor, exposure pathway, and constituent in each exposure area. Benchmarks selected for the assessment are those consistent with USEPA guidance, incorporating an acceptable range of 1×10^{-6} to 1×10^{-4} for potential cumulative cancer risks, a target noncancer hazard index (HI) of 1, and an upperbound fetal blood lead level of 10 micrograms per deciliter (µg/dL). A summary of the results for each area and receptor is provided below:

- **Western Area:** For the outdoor worker potentially exposed to COI in soil, the total noncancer HI is 0.61 and the potential cancer risk is 4.66×10^{-5}. For the construction worker potentially exposed to COI in soil, the total noncancer HI is 0.57 and the potential cancer risk is 1.60×10^{-6}. For the indoor worker potentially exposed to COI in indoor air (vapor intrusion from shallow groundwater), the total noncancer HI is 0.01 and the potential cancer risk is 3.13×10^{-8}.

- **Central Area**: For the outdoor worker potentially exposed to COI in soil, the total noncancer HI is 0.26, the potential cancer risk is 7.24×10^{-6} and the predicted fetal blood lead concentration is 2.73 ug/dL. For the construction worker potentially exposed to COI in soil, the total noncancer HI is 0.66, the potential cancer risk is 3.75×10^{-7} and the predicted fetal blood lead concentration is 2.50 ug/dL. For the indoor worker potentially exposed to COI in indoor air using modeled concentrations (vapor intrusion from shallow groundwater), the total noncancer HI is 0.015, and the potential cancer risk is 9.76×10^{-8}. For the indoor worker potentially exposed to COI in indoor air (measured concentrations from Building E), the total noncancer HI is 0.59. No COI with potentially carcinogenic endpoints were identified for the indoor worker exposed to volatiles in indoor air; therefore, a potential cancer risk was not calculated for this scenario.

- **Eastern Area**: For the outdoor worker potentially exposed to COI in soil, the total noncancer HI is 0.028, the potential cancer risk is 2.80×10^{-6} and the predicted fetal blood lead concentration is 3.27 ug/dL. For the construction worker potentially exposed to COI in soil, the total noncancer HI is 0.25, the potential cancer risk is 3.54×10^{-7} and the predicted fetal blood lead concentration is 2.91 ug/dL. For the indoor worker potentially exposed to COI in indoor air (vapor intrusion from shallow groundwater), the total noncancer HI is 0.022 and the potential cancer risk is 7.79×10^{-8}.

- **East Fork of Chisholm Creek**: For the recreational adult potentially exposed to COI in sediment, the total noncancer HI is 0.0028, the potential cancer risk is 5.91×10^{-7} and the predicted fetal blood lead concentration is 2.76 ug/dL. For the recreational youth potentially exposed to COI in sediment, the total noncancer HI is 0.0051, the potential cancer risk is 4.22×10^{-7} and the predicted fetal blood lead concentration is 2.76 ug/dL.

Based on analyses presented in this report, considering current and expected future use, theoretical excess lifetime cancer risks meet acceptable levels (within or below USEPA's target risk range of 1×10^{-6}

to 1 x 10^{-4} for cumulative effects) for all receptors in all site areas. HIs for all receptors and exposure pathways are also below the benchmark value of 1. The evaluation of exposure to lead in soil indicates that estimated fetal blood lead concentrations are projected to be below the benchmark value of 10 µg/dL for the outdoor worker and the construction worker in the Central and Eastern Areas and for the recreational receptors in the East Fork of Chisholm Creek.

1.0 INTRODUCTION

This risk assessment report has been prepared by RBR Consulting Inc. (RBR), on behalf of Cameron-Cole, LLC (Cameron-Cole), for the Clean Harbors Kansas, LLC site located in Wichita, Kansas (site). The risk assessment consists of a quantitative analysis of the potential for adverse effects to human health that may be associated with constituents present in environmental media associated with the site.

1.1 PURPOSE OF THE RISK ASSESSMENT

Risk assessment is defined as the scientific evaluation of potential health effects posed by a particular substance or mixture of substances. The purpose of this risk assessment is to provide quantitative analyses, in a conservative and health-protective manner, of the likelihood that adverse health effects may be associated with potential exposures to constituents in environmental media associated with the site. In providing health-related information on potential human contact with site-associated constituents, this risk assessment is designed to provide a sound basis for risk management decisions.

This risk assessment presents an analysis of the site under current and expected future conditions. The risk assessment provides an understanding of the nature of constituent presence, the possible pathways of human exposure, and the degree to which such exposure may pose a potential for adverse effects. This report focuses on current and expected future non-residential use of the site.

1.2 REGULATORY FRAMEWORK AND APPROACH

The Clean Harbors Kansas, LLC is performing corrective action activities at the site under the United States Environmental Protection Agency's (USEPA) Resource Conservation and Recovery Act (RCRA). Therefore, this risk assessment has been prepared according to standard USEPA procedures and guidance documents (1989; 1991a; 1992a; 2002a; 2002b; 2004a; 2004b; 2005a; 2005b; 2009a; 2011a). In addition, guidance from the Kansas Department of Health and Environment (KDHE, 2010) is referenced as appropriate, although the primary source is the USEPA.

The scientific basis and validity of values used in this assessment are considered and discussed in the context of primary research literature in order to provide a frame of reference for the conclusions. The actual levels of human exposure and the potential health risks associated with exposure to constituents at the site are likely to be significantly lower than the quantitative estimates described in this assessment, due to the conventional practice of using conservative assumptions in preparing risk assessments.

This risk assessment follows the guidelines published in the USEPA's Risk Assessment Guidance for Superfund (USEPA, 1989), which suggest that risk assessments should contain the following four major steps:

- **Data Collection and Evaluation** - Involves gathering and analyzing site investigation data and identifying constituents of interest (COI) with regard to potential health effects;

- **Exposure Assessment** - Identification of the human receptors likely to be exposed to site-originated COI and the likely extent of their exposure under defined exposure scenarios;

- **Toxicity Assessment** - A description of the relationship between the magnitude of exposure (dose) and the probability of occurrence of adverse health effects (response) associated with the COI; and

- **Risk Characterization** - Description of the nature and magnitude of potential human health risks, comparison to federal benchmarks regarding health risks, and discussion of uncertainties in the analysis.

1.3 RISK ASSESSMENT ORGANIZATION

This report is organized in a manner consistent with the above-mentioned sections of a risk assessment. Following this introduction, the remaining sections of the report are as follows:

- Section 2 presents the site background and the procedures for identifying CO for the site.

- Section 3 identifies likely human receptors for the site and presents the exposure factors that are used to estimate the extent of exposure for each receptor.

- Section 4 describes the standard procedures for deriving toxicity values and presents the USEPA toxicity values for the COI.

- Section 5 quantifies and summarizes the potential risks associated with exposure to the COI.

- Section 6 describes the uncertainties associated with the calculated exposures and potential health risks.

- Section 7 presents the conclusions of the risk assessment.

- Section 8 presents the references cited in the report.

2.0 SITE BACKGROUND AND DATA EVALUATION

This section presents relevant site background information, including a physical description of the site and a summary of historical investigations. This section also includes a summary of the analytical data collected during the characterization activities, and identifies the subgroup of constituents detected in site media that will be evaluated quantitatively in the human health risk assessment. The basis for this screening is presented in greater detail below, but basically, it allows the elimination in the initial step of the risk assessment of constituents that will clearly pose a negligible contribution to overall site risk.

2.1 SITE BACKGROUND

The Clean Harbors site (EPA Identification Number KSD007246846) is approximately six acres in size and is located at 2549 New York Avenue, in an industrialized area of Wichita, Kansas. The site is a hazardous waste management facility operating under a RCRA Part I permit that has been used for manufacturing and/or chemical waste handling for approximately 60 years. Accompanying this operating permit was a Corrective Action Permit (Part II) issued under the authority of the Hazardous and Solid Waste Amendments to RCRA. The facility is permitted to conduct regulated waste management activities including the storage, treatment, and recovery for recycling of hazardous and non-hazardous wastes. Wastes handled at the facility include paints (and related wastes), batteries, fluorescent lights, incinerable hazardous solids, lab packs, mercury, household hazardous wastes, off-specification and production wastes from industries, both chlorinated and non-chlorinated petroleum-based waste solvents, plating wastes, and corrosives. Wastes that are received at the facility are reclaimed or directed to an appropriate facility for handling.

The site lies within the North Industrial Corridor (NIC), which includes most of the industrial corridor near the facility. The NIC, which includes over 4,000 acres of property, has been identified as having a dissolved groundwater plume of chlorinated volatile organic compounds (VOCs) present. The NIC is undergoing its own environmental investigation of a dissolved chlorinated VOC plume under the supervision of the City of Wichita, with oversight by KDHE. A City of Wichita ordinance (Ord. No. 43-156 S 2) is in place that prohibits installation of groundwater wells for personal use within the NIC. Personal use is defined in the ordinance as "the use of water from a well for purposes including drinking, cooking, bathing, and sewage disposal".

The site is comprised of several solid waste management units (SWMUs), areas of concern (AOCs), and other areas (OAs) that were investigated during previous RCRA Facility Investigation (RFI) activities. There are also ten buildings at the site labeled Buildings A through K, as well as a Processing Area and Drum Dock that are open areas covered by a roof. Detailed descriptions of all SWMUs, AOCs, OAs, and buildings are provided by Cameron-Cole in the RFI Report (2005). The locations of these areas are

presented in Figure 2-1. Buildings A, E, and G are used for offices, administration, a laboratory, and personnel decontamination and break rooms. These buildings are located near the facility entrance off 25th Street. Buildings B, C, D, I, and J are or have been used for various hazardous waste management operations. Buildings H and K are used as an operations office and mechanical equipment building, respectively.

For purposes of this risk assessment, the site was subdivided into areas of interest based on historical and current use and the potential for current and future exposure. Onsite, these areas consist of (1) the Western Area, which includes Building C and the Drum Dock and the parking area to the south; (2) the Central Area, which includes Buildings A, B, D, E, G, and H and the Processing Area; and (3) the Eastern Area, which includes Buildings I, J and K and the area between 25th Street and New York Avenue. Currently, only Building C and Building E are occupied; Building C is used for operations and Building E is occupied by administration personnel. The risk assessment areas of interest are identified in Figure 2-1.

The following sections summarize the physical characteristics at the facility including climate, physiography, land use, geology, hydrogeology, and surface water hydrology. The information provided is based upon field observations, analytical data collected at the facility (soil and groundwater quality), surface water data collected from the East Fork of Chisholm Creek, monitoring wells located on the facility and within the NIC, borings drilled on the facility property, and published information. A more detailed description of site physical characteristics is provided in the RFI Report (Cameron-Cole, 2005).

2.1.1 Site Climate

The Wichita area climate is subhumid and continental with varying temperatures depending on the season. The average temperature from 1888 until 2000 was 55.9 °F. Average monthly temperatures range from 29.8°F in January to 80.6°F in July. The average rainfall between 1971 and 2001 was 29.9 inches per year. Monthly average precipitation ranges from 0.81 inches in January to 4.46 inches in June. The average annual wind speed exceeds 12 miles per hour. Winds are predominantly from the south, except in the winter when they are predominantly from the north (CDM, 2002). Evapotransporation for the area averages 25 to 30 inches per year and the annual groundwater loss is estimated at 3.5 inches annually (where water is found at depths of less than 10 feet) (CDM, 2002).

2.1.2 Site Physiography

The facility lies within the tributary basin of the Arkansas River. Specifically, this area is in the Arkansas River Lowlands section of the Central Lowland physiographic province. The Arkansas River Valley is characterized as a relatively flat, smooth plain, with local relief up to 300 ft. Minimal relief characterizes the facility with surface elevations of approximately 1,315 feet above mean sea level (msl).

The Little Arkansas River lies approximately two miles west of the facility site and flows from north to south. The confluence of the Little Arkansas and the Arkansas River is approximately three miles southwest of the site. The East Fork of Chisholm Creek lies directly east of the site at a distance of approximately 100 to 150 feet. Chisholm Creek lies approximately 2,000 feet west of the site. The creeks are the closest surface water bodies to the site (CDM, 2002).

2.1.3 Land Use in Vicinity of Site

The site is located at 2549 New York Avenue in an industrialized area of Wichita, Kansas. The site is bordered by the El Paso Corporation (formerly Coastal Derby) refinery to the south and west and a Union Pacific Railroad rail yard to the north. New York Avenue, the East Fork of Chisholm Creek, and the Interstate-135 lie east of the site. Farmland Elevator Facility lies approximately 500 feet northwest of the facility. As stated above, the site lies within the NIC, which includes most of the industrial corridor near the facility.

Local land use, as reported in the NIC RI Report (CDM, 2002), includes agriculture (339 acres), parks (57 acres), schools (9 acres), hospitals (45 acres), residential (490 acres), vacant (149 acres), and commercial/industrial (2,922 acres). Within the NIC site, residential properties lie primarily in the southeastern and southwestern areas, over a mile south of the facility. Outside of the NIC site, the closest residential property to the facility is located about a quarter mile east of the site, east of the East Fork of Chisholm Creek and Interstate-135.

2.1.4 Geology

Subsurface stratigraphy at the facility was interpreted from selected borings installed at the facility along with electrical conductivity logs. Based on these interpretations, it was determined that shallow subsurface typically consists of approximately 7 to 17 feet of gravelly clay and silt. This is underlain by approximately 9 to 17 feet of sand with occasional clay lenses. Below this sand lies a clay layer, approximately 2 to 4 feet thick, which appears to pinch out in the southwestern corner of the site. The clay is generally underlain by another 8 to 9 feet of sand. These two intervals of sand, separated by the clay, correspond to the alluvial and terrace deposits ranging from the Pliocene Age Ogallala Formation to the Recent Age. Another clay layer, approximately 2 to 8 feet thick, believed to represent weathered bedrock, underlies the sand. Competent bedrock, which reportedly consists of the Wellington Shale, is encountered at depths ranging from 35 to 42 feet bgs. The Wellington Formation is estimated to be approximately 200 feet thick in the vicinity of the facility and slopes gently toward the west at about 10 feet per mile (PRC, 1990).

2.1.5 Hydrogrology

This section provides a summary of the site hydrogeology as presented in the RFI Report (Cameron-Cole, 2005). The shallow aquifer beneath the site occurs in the sandy alluvial and terrace deposits. Although the alluvium and terrace deposits are stratified and lenticular in occurrence, the sand and gravel beds are interconnected. Therefore, the stratified unconsolidated beds respond to long-term withdrawals of groundwater as a single hydraulic unit. The discussion has been divided into separate sections for the upper and lower zones of the aquifer. A two to four foot thick clay layer separates these flow zones across much of the site.

As noted in Section 2.1.1, a City of Wichita ordinance (Ord. No. 43-156 S 2) is in place that prohibits installation of groundwater wells for personal use within the NIC. The City has indicated it is in the process of confirming groundwater use for water supply at other properties, and terminating use as appropriate under the ordinance (CDM, 2002).

2.1.5.1 Upper Zone

The depth to groundwater at the site is typically 12 to 16 feet bgs, but can vary a foot or more based on recent precipitation events. The saturated portion of the alluvial aquifer is 21 to 23 feet thick in total. It is underlain by clay that functions as a shallow semi-confining unit within the alluvial aquifer beneath the site. Groundwater occurs in the upper sand zone under water table conditions.

The direction of groundwater flow identified in the upper zone in each gauging event has been to the southeast towards the East Fork of Chisholm Creek, which is consistent with the aquifer as a whole based on the NIC investigation data. A current potentiometric surface map for the upper zone is presented by Cameron-Cole (2014). The hydraulic gradient varies from approximately 0.002 to 0.003. A comparison of surface water elevations to groundwater elevations suggests that groundwater in the shallow zone of the alluvial aquifer may be hydraulically connected to the East Fork of Chisholm Creek. The groundwater elevations in wells SK-10S and SK-11S west of Chisholm Creek and in well SK-13S east of Chisholm Creek indicate that groundwater flows towards the creek.

Quantitative estimates of hydraulic properties have been generated from work performed as part of the NIC activities. A pumping test conducted near 22nd Street and Broadway resulted in an estimated hydraulic conductivity of 185 feet/day (CDM, 2002). The velocity of groundwater flow (i.e., seepage velocity) for the shallow portion of the alluvial aquifer can be estimated from Darcy's Law by multiplying the hydraulic conductivity by the hydraulic gradient, and dividing that value by the effective porosity of the formation. Using an estimated effective porosity of 0.3, a hydraulic gradient of 0.0025, and the range of

hydraulic conductivities provided above, the estimated groundwater flow velocity is from 400 to 1,300 feet/year.

2.1.5.2 Lower Zone

Groundwater occurs in the lower zone under semi-confined conditions across most of the site as a result of the overlying two to four foot-thick clay layer. The clay is encountered below most of the site at an approximate elevation of 1,288 to 1,290 feet msl. The clay pinches out in the southwestern portion of the site. The groundwater flow direction in the lower zone of the alluvial aquifer is to the south-southeast, which is similar to the upper zone. A current potentiometric surface map for the lower zone is presented by Cameron-Cole (2014).

A slight upward vertical hydraulic gradient generally exists in the deeper zone of the alluvial aquifer in the vicinity of well pairs SK-1S/1D and SK-2S/2D, and to a lesser extent at well pair SK-5S/5D at the site. This data suggests that the clay layer in the vicinity of these well pairs may act as a semi-confining unit within the alluvial aquifer, and may impede the downward migration of dissolved constituents to the lower aquifer zone. The magnitude of the head differential appears to decrease in the well pairs (SK-3S/3D and SK-4S/4D) on the western side of the site, where the clay unit pinches out.

2.1.6 Surface Water Hydrology

As mentioned in Section 2.1.2, the facility lies within the tributary basin for the Arkansas River. Drainage from the facility is to tributaries of Chisholm Creek, a tributary of the Arkansas River. The East Fork of Chisholm Creek is the closest surface water body to the site and is located about 150 feet east of the property. The West Fork of Chisholm Creek is located about 2,000 feet west of the site. These streams discharge to the Arkansas River about three miles south of the site.

The East Fork of Chisholm Creek is concrete lined in places, but near the facility it is unlined. On-site data and interpreted flow maps demonstrate that the shallow zone alluvial groundwater is likely hydraulically connected to, and discharges into, the East Fork of Chisholm Creek.

There are no surface water bodies on the facility property. Runoff from the central part of the site flows north and west, parallel to the property boundary, then south along the western boundary of the property. Runoff from the south central and southwestern portions of the property flows south towards a berm that provides containment for oil storage tanks at the El Paso refinery. Surface water drainage from the eastern portion of the property is to the north to a drainageway or ditch that flows east along the northern property boundary and into the East Fork of Chisholm Creek.

2.2 SAMPLING CONDUCTED AT THE SITE

The original RFI work was conducted in several phases between November 1999 and November 2002. The work focused on an evaluation of the nature and extent of soil and groundwater quality impacts at the various SWMUs, AOCs, and OAs identified at the facility as part of the RFI. Each phase of work was conducted according to a USEPA approved work plan. The Phase I RFI Work Plan (Environmental Decision Group, Inc., 1999) was initially prepared in 1998 and final approval was received from the agencies on December 2, 1999. The Phase I Work Plan identified the initial sampling activities and provided a description of investigation methodologies, standard operating procedures, and a Quality Assurance Plan for the RFI. Subsequent phases of work were conducted in accordance with approved work plan addenda consisting primarily of a Phase II Work Plan (Cameron-Cole, 2001) approved November 6, 2001, and a Phase III Work Plan (Cameron-Cole, 2002) approved July 18, 2002. Supplemental investigation activities conducted subsequent to the Phase III investigation work include soil sampling and groundwater and surface water monitoring.

In October 2013, additional investigation activities were initiated at the site as a result of agreements with USEPA to revise and advance the RFI process. As such, comprehensive surface and subsurface soil sampling activities were conducted throughout all areas of the site, including the areas previously investigated. Direct push groundwater samples were collected to supplement the semi-annual monitoring that was ongoing at the site. In addition, a limited number of soil vapor and indoor air samples were collected from Building E. In the East Fork of Chisholm Creek, samples of sediment, surface water and pore water were collected.

All available soil, groundwater, soil gas, indoor air, surface water and sediment data collected during the most recent RFI activities (conducted in October 2013 through January 2014) are included in the risk assessment. In addition, groundwater data from the four most recent rounds of semi-annual monitoring well sampling are included. Earlier data collected from the site have not been included in this risk assessment, because the more recent samples cover the same areas sampled historically, and the recently collected data better represent current conditions at the site. A summary of the analytical data included in this risk assessment is presented by medium in the following subsections.

2.2.1 Soil Samples

Surface and subsurface soil samples were collected from the site between October 2013 and January 2014. Surface soils are classified as soil from 0 to 2 feet, and samples from greater depths [up to 35 feet below ground surface (ft-bgs) for this site] are considered to be subsurface soils. As previously noted, onsite soil data were divided into discrete areas of interest (the Western, Central, and Eastern Areas) for the risk assessment. Data collected from each area are evaluated separately.

The following samples are included in this risk assessment. For the Western Area, 50 surface (plus one duplicate) and 145 subsurface soil samples (plus nine duplicates) were included in the risk assessment. For the Central Area, 96 surface (plus 4 duplicates) and 213 subsurface soil samples (plus 5 duplicates) were included. For the Eastern Area, 74 surface and 190 subsurface soil samples (plus 9 duplicates) were included in the risk assessment. The soil samples from all three areas were analyzed for VOCs, semi-volatile organic compounds (SVOCs), and inorganic constituents. In addition, samples from the Central and Eastern Areas were also analyzed for polychlorinated biphenyls (PCBs), select herbicides and pesticides, and total petroleum hydrocarbons (TPH). All sample identification numbers and sampling dates are presented in Table 2-1, and the complete analytical data are provided in Appendix A, Table A-1. Soil sampling locations are depicted on Figure 2-2.

2.2.2 Groundwater Samples

As noted in Section 2.1.5.1, the depth to groundwater is typically 12 to 16 ft-bgs (Cameron-Cole, 2005). The shallow, upper zone of the alluvial aquifer is underlain by a clay layer that functions as a shallow semi-confining unit. The clay layer is not continuous; however, in areas where it is present, this clay is expected to retard downward migration of shallow groundwater and associated dissolved constituents to the deeper (lower) zone of the alluvial aquifer. Groundwater flow direction in both shallow and deep zones is to the south-southeast, generally toward the East Fork of Chisholm Creek. Shallow zone alluvial groundwater is likely hydraulically connected to, and discharges into, the creek.

Groundwater data are available from direct push sampling locations, as well as monitoring well locations. Groundwater samples from direct push sampling points collected in October 2013 are included in the assessment, as well as samples from monitoring wells collected during four most recent rounds of semi-annual sampling (April 2012, November 2012, April 2013 and October 2013).

Figure 2-2 presents the locations of site monitoring wells. A total of 17 wells are currently located within the site boundaries: 3 shallow wells (SK-4S, SK-12S, SK-B92) and 3 deep/fully penetrating wells (SK-4D, SK-12D, HRI-03) are located in the Western Area; 4 shallow wells (SK-2S, SK-3S, SK-5S, and SK-B68) and 3 deep wells (SK-2D, SK-3D, SK-5D) are located in the Central Area; and 2 shallow wells (SK-1S and SK-6S) and 2 deep/fully penetrating wells (SK-1D and RSC-1) are located in the Eastern Area. In addition, 7 shallow wells (MW-10, MW-11, MW-14, MW-15, MW-18, SK-8S and WND-32S) and 4 deep wells (SK-7D, SK-8D, SK-9D and WND-32D) are located upgradient of the property. Downgradient from the site, to the west of the creek, are shallow wells SK-10S and SK-11S, and well SK-13S is located to the east of the creek. There are no deep wells located downgradient from the site.

Direct push groundwater samples were collected from several locations throughout the site during the October 2013 investigation in order to characterize the shallow groundwater in the vicinity of SWMUs and

AOCs. These samples serve to supplement the on-going semi-annual sampling of monitoring wells at the site. Direct push groundwater sample locations are presented in Figure 2-2.

Groundwater data are evaluated separately for the onsite/downgradient areas and for the upgradient area. Groundwater samples were analyzed for VOCs, SVOCs, TPH, total and dissolved inorganics and miscellaneous chemical parameters including dissolved oxygen, alkalinity, pH, redox potential, specific conductance, turbidity, chloride, fluoride, hardness, nitrate, sulfate, sulfide, total solids, and total organic carbon. Table 2-2 provides a list of the groundwater sample identification numbers and sampling dates for all groundwater samples included in the risk assessment. The complete analytical groundwater data are provided in Appendix A, Table A-2.

2.2.3 Soil Gas and Indoor Air Samples

Five air samples (AS-1 through AS-5) were collected from the site in October 2013. Samples AS-1 and AS-2 represent indoor air samples collected upstairs and downstairs inside Building E, which is located in the Central Area of the site. AS-4 and AS-5 were subslab (soil gas) samples collected beneath the building foundation of Building E. AS-3 represents an ambient air "background" sample taken outside just south of Building A. The soil gas and indoor air samples were analyzed for VOCs. The sample identification numbers and sampling dates are presented in Table 2-3. The complete analytical data are provided in Appendix A, Table A-3. Figure 2-2 presents the vapor point sampling locations.

2.2.4 Sediment Samples

Sediment samples were collected from the East Fork of Chisholm Creek between October 4 and October 11, 2013 from eleven locations identified as CC-1 through CC-11. The sediment samples were analyzed for SVOCs, metals, percent solids and total organic carbon. Sediment sample locations and sampling dates are presented in Table 2-4. The complete analytical sediment data are provided in Appendix A, Table A-4. Figure 2-3 presents the locations of the sediment sampling stations.

2.2.5 Surface Water Samples

On October 18, 2013, as part of the semi-annual sampling conducted at the site, surface water samples were collected from five locations (SW-1 through SW-5) along the East Fork of Chisholm Creek adjacent to the site. These five surface water samples (identified as SR-SW-1 through SR-SW-5) are included in the quantitative risk assessment. Five additional surface water samples (identified as SW-BS-1 through SW-BS-5) were collected on the same date as part of the ecological field investigation. These samples were collected in the same general locations, and are also included in the quantitative risk assessment. It should

be noted that surface water samples collected prior to October 2013 are not included in this assessment; the most recent set of samples is considered to provide the most representative data set.

The surface water samples were analyzed for VOCs. Sample locations and dates are presented in Table 2-4. The complete analytical surface water data are provided in Appendix A, Table A-5. Figure 2-3 presents the locations of the surface water sampling stations.

2.3 DATA USABILITY

USEPA (1992b) provides guidance for data usability in risk assessments. USEPA's process for establishing data usability is intended to assure or determine that the quality of the data generated meets the intended use. The analytical data collected from the site were evaluated with respect to data usability prior to inclusion in this risk assessment. The following data quality issues are addressed in this section: (1) detection limits, (2) qualified data, and (3) quality control samples.

The analytical data generated during the most recent sampling activities were evaluated against applicable quality assurance and quality control (QA/QC) requirements and guidelines. For this report, the analytical data were further evaluated according to USEPA guidance with respect to detection limits and data qualifiers prior to inclusion in the risk assessment.

Selecting the analytical method for optimal detection limits is critical to the data usability in risk assessments. If detection limits are consistently greater than comparison values, this affects the confidence in the results of the risk assessment because there is a possibility that constituents are present at levels between the screening benchmark and the detection limit. Therefore, as part of this risk assessment, the detection limits for constituents are compared to the appropriate screening benchmarks. Constituents that are identified as COI in one area of the site will be retained as COI for other areas of the site if (1) their detection limits exceed screening benchmarks and (2) that constituent was detected at least once in that area (it would not be appropriate to derive a representative source concentration based on all non-detect data). Constituents that are not present but whose detection limits are elevated above screening benchmarks will be discussed qualitatively in the Uncertainty Analysis (Section 6).

Qualified data must be appropriately used in risk assessments. All validated, qualified data were considered usable for this assessment with the exception of unusable or rejected ("R" qualified) samples. As a result of the data validation process, data for several groundwater, sediment and soil samples were "R" qualified and therefore excluded from the data sets used in the quantitative assessment. Constituents which were "R" qualified for at least one sample include: 2,4-dichlorophenol, 2-chlorophenol, 4-bromopnenyl phenyl ether, 4-choloro-3-methylphenol, benzyl alcohol, and 2-chloroethyl vinyl ether in groundwater; 3-3'-

dichlorobenzidine, 4-bromophenyl phenyl ether and 4-nitrophenol in sediment; and; 2-chloroethyl vinyl ether, 3-3'dichlorobenzidine, 4-beomophenyl phenyl ether, 4-nitrophenol, carbon disulfide, delta-BHC, dinoseb and methyl tert-butyl ether in soil. The "R" qualified results are presented in Appendix A but not included in the quantitative assessment.

Data with results that are estimated ("J" qualified) are included, and may be discussed qualitatively. Several results from the analytical data sets were qualified "J" because the detected values were below their detection limits or because of matrix spike recoveries that did not meet control limits. The "J" qualified results are presented in Appendix A.

Quality control samples (such as method blanks, trip blanks, and matrix spike samples) are generally not used in the risk assessment, with the exception of field duplicate samples. All duplicate samples are averaged in this assessment as follows: (1) if both results are detected, the mean of the two values is used to represent that sample; (2) if both results are non-detect, the higher detection limit is used to conservatively represent that sample; and (3) if one result is detected and the other is non-detect, the detected value is used to conservatively represent that sample.

2.4 IDENTIFICATION OF CONSTITUENTS OF INTEREST

An important step in the risk assessment is to identify the COI at a site. Although several constituents have been detected in samples of soil, groundwater indoor air, soil gas, sediment and surface water from the site, many of these are not present at concentrations considered to pose a concern by customary risk assessment standards and may be eliminated from further consideration in this preliminary step. In other words, many constituents may be detected at the site, but their presence does not contribute significantly to cumulative risks; therefore, they may be eliminated from further assessment. The comparison values, such as those used in this risk assessment, are constituent-specific, risk-based values that are derived using conservative exposure assumptions. If a constituent is detected below these values, it is not expected to pose a risk to human health and need not be evaluated further. This serves to make the risk assessment more meaningful by focusing attention on those constituents that may contribute significantly to the calculated risks. The constituents that cannot be eliminated are identified as COI and are carried through to the site-specific, quantitative risk assessment.

It is important to recognize that the selection of a constituent as a COI does not necessarily indicate that it poses a significant health risk. The selection of a constituent only indicates that there is a need to evaluate it quantitatively in the risk assessment to determine if that constituent may be associated with potential health risks.

The media associated with the site are onsite surface and subsurface soil, onsite and downgradient shallow and deep alluvial groundwater, upgradient shallow and deep groundwater, soil gas and indoor air from Building E, and surface water and sediment from the East Fork of Chisholm Creek. COI are identified separately for each medium and exposure area.

2.4.1 Constituents of Interest in Soil

For constituents in soil, the COI identification process consists of a comparison of the maximum detected concentration of each constituent with the USEPA (2013a) Regional Screening Levels (RSLs) for Industrial Soil. Those constituents whose maximum detected concentrations were below the RSLs were eliminated as COI. The RSLs selected for use in this screening evaluation consist of: (1) the industrial soil RSLs (applicable to non-residential direct contact exposure pathways including incidental ingestion of soil, inhalation of particulates/vapors emitted from soil, and dermal contact with soil), and (2) the risk-based protection of groundwater soil screening levels (SSLs).

Both direct contact RSLs and soil to groundwater migration SSLs for reflect a screening hazard quotient (HQ) of 0.1 and a target potential risk of 1E-6. The soil to groundwater migration SSLs were further adjusted to reflect a site-specific dilution-attenuation factor (DAF) of 24.1. The site-specific DAF was calculated using Equation 4-11 from USEPA (2002a) and incorporating the following site-specific system parameters: a hydraulic conductivity of 15,019 m/yr [converted from 135 ft/day based on a pump test conducted at the site in 1990 (CDM, 2002)]; a hydraulic gradient of 0.0025 ft/ft (based on the site-specific average for the upper zone; refer to Section 2.1.5.1); an infiltration rate of 0.18 m/yr (in the absence of a measured value for the site, this is the default value presented by USEPA (2002a) for mass-limit calculations of migration to groundwater); a source length of 120 ft (the site-specific source length, based on soil data, parallel to groundwater flow); and an average aquifer thickness of 20 ft (upper and lower zones combined). The equation, site-specific input factors, and resulting DAF are presented in Table 2-5.

If RSLs were not available for a particular constituent, surrogate screening values are selected based on constituents with structural similarity. In addition, because an industrial soil RSL is not available for total chromium, for this risk assessment a comparison value has been calculated based on the assumption that hexavalent and trivalent chromium are present at a ratio of 1:6 (Cr IV to Cr III), consistent with the ratio presented by USEPA (2013a). The industrial soil RSL values are 150,000 mg/kg for trivalent chromium and 5.6 mg/kg for hexavalent chromium. Therefore, the site-specific RSL for total chromium is calculated to be: (150,000 x 6) + (2.6 x 1) / 7 or 128,572 mg/kg. Similarly, the site-specific RSL for the protection of groundwater is calculated to be 57,840,000 mg/kg.

It should be noted that TPH-DRO was detected in several samples in the Central and Eastern Areas of the site. However, the heterogeneity of TPH fractions, and the uncertainty of their exact composition

precludes evaluation of these constituents in a quantitative risk assessment. Therefore, a more reliable toxicological evaluation, based upon an evaluation of defined components of the TPH fractions (i.e., BTEX and PAHs, including naphthalene), was conducted. This approach is discussed in the uncertainty section.

Screening was completed separately for direct contact and soil to groundwater migration pathways for each area. The results of the screening process are presented in Tables 2-6 through 2-11. For each constituent, these tables present the detection frequency, the minimum and maximum detected concentrations, the sample with the maximum detect, the minimum and maximum detection limits, and the screening levels. The maximum detected concentration of each constituent in soil is compared to the RSLs. Constituents that exceed the RSLs are identified as COI for soil.

Western Area

Table 2-6 indicates that the following constituents were detected at concentrations exceeding the industrial soil RSLs and are identified as direct contact COI in soil of the Western Area: tetrachloroethene, trichloroethene and arsenic.

Table 2-7 indicates that the following constituents were detected at concentrations exceeding the risk-based protection of groundwater SSLs and are identified as migration to groundwater COI in soil of the Western Area: 1,1-dichloroethane, 1,2,4-trimethylbenzene, 1,4-dioxane, cis-1,2-dichloroethene, hexachlorobutadiene, tetrachloroethene, total xylenes, trans-1,2-dichloroethene, trichloroethene, benzo(a)pyrene, hexachlorobenzene, naphthalene, arsenic, cadmium, iron, manganese, mercury and selenium.

Tables 2-6 and 2-7 also indicate several constituents with maximum detection limits above the RSLs. The elevated detection limits are frequently due to elevated detections of other constituents in select samples that resulted in dilution of the sample and thus, high detection limits. The elevated detection limits are unlikely to affect the usability of the data, because as indicated in Appendix A-1, for most constituents there are several samples with detection limits below the RSLs while only a few exhibit the elevated detection limits. Furthermore, the majority of these constituents were either (1) already retained as COI because the maximum detected concentration exceeded the screening value, or (2) excluded as COI because they were not detected at all in soil samples from the Western Area.

Specifically, as indicated in Table 2-6, 1,2,3-trichloropropane, acrolein, acrylonitrile, benzidine and N-nitrosodimethylamine had detection limits exceeding the direct contact industrial soil RSLs (as indicated by a value in bold type) but were not detected at all in samples from the Western Area. As indicated in Table 2-7, detection limits for several VOCs and SVOCs exceed the migration to groundwater SSLs. Of

these, the majority of the constituents were not detected at all or very infrequently in soil samples from the Western Area. In addition, 1,2,4-trimethylbenzene, 1,4-dioxane, hexachlorobutadiene, total xylenes, trichloroethene, benzo(a)pyrene, hexachlorobenzene, naphthalene and selenium were already identified as COI. Further discussion of constituents with detection limits exceeding the screening values is provided in the Uncertainty Analysis (Section 6).

Central Area

Table 2-8 indicates that the following constituents were detected at concentrations exceeding the industrial soil RSLs and are identified as direct contact COI in soil of the Central Area: 1,2,4-trimethylbenzene, ethylbenzene, naphthalene, tetrachloroethene, total xylenes, trichloroethene, benzo(a)pyrene, MCPP, toxaphene, arsenic and lead. In addition, consistent with the approach outlined in Section 2.3, vinyl chloride is retained as a COI for the Central Area because the detection limit for this constituent exceeded the RSL, and vinyl chloride is a COI for direct contact in other onsite areas.

Table 2-9 indicates that the following constituents were detected at concentrations exceeding the risk-based protection of groundwater SSLs and are identified as migration to groundwater COI in soil of the Central Area: 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,2,4-trimethylbenzene, 1,2-dichloroethene, total, 1,3,5-trimethylbenzene, 1,4-dioxane, 4-isopropyltoluene, chloroform, cis-1,2-dichloroethene, ethylbenzene, isopropylbenzene, m,p-xylenes, methylene chloride, naphthalene, n-butylbenzene, n-propylbenzene, o-xylene, tetrachloroethene, total xylenes, trans-1,2-dichloroethene, trichloroethene, vinyl chloride, 1-methylnaphthalene, aniline, benzo(a)anthracene, benzo(a)pyrene, di-n-butyl phthalate, isophorone, heptachlor epoxide, MCPP, pentachlorophenol, toxaphene, arsenic, barium, cadmium, cobalt, iron, manganese, mercury, selenium and titanium.

Tables 2-8 and 2-9 also indicate several constituents with maximum detection limits above the RSLs. The elevated detection limits are frequently due to elevated detections of other constituents in select samples that resulted in dilution of the sample and thus, high detection limits. The elevated detection limits are unlikely to affect the usability of the data, because as indicated in Appendix A-1, for most constituents there are several samples with detection limits below the RSLs while only a few exhibit the elevated detection limits. Furthermore, the majority of these constituents were either (1) already retained as COI because the maximum detected concentration exceeded the screening value, or (2) excluded as COI because they were not detected at all in soil samples from the Central Area.

Specifically, as indicated in Table 2-8, the majority of constituents exhibiting elevated detections limits were not detected at all in soil samples from the Central Area. In addition, trichloroethene, benzo(a)pyrene, and MCPP were already identified as direct contact COI for the Central Area. Although 1,1,2-trichloroethane, 1,1-dichloroethane, benzene, carbon tetrachloride, chloroform,

dibenz(a,h)anthracene and Aroclor 1254 exhibit elevated detection limits, they were not identified as COI for soil direct contact in other areas of the site; thus, these constituents were ultimately excluded as COI for direct contact.

As indicated in Table 2-9, detection limits for several VOCs and SVOCs exceed the migration to groundwater SSLs. Of these, the majority of the constituents were not detected at all or very infrequently in soil samples from the Central Area, or were already identified as COI for the Central Area. Further discussion of constituents with detection limits exceeding the screening values is provided in the Uncertainty Analysis (section 6).

Eastern Area

Table 2-10 indicates that the following constituents were detected at concentrations exceeding the industrial soil RSLs and are identified as direct contact COI in soil of the Eastern Area: 1,2,4-trimethylbenzene, ethylbenzene, tetrachloroethene, total xylenes, trichloroethene, vinyl chloride, arsenic and lead. In addition, consistent with the approach outlined in Section 2.3, naphthalene and benzo(a)pyrene are retained as COI for the Eastern Area because the detection limit for these constituents exceeded their respective RSL, and were identified as COI for direct contact in other onsite areas. It should be noted that m,p-xylenes and o-xylene were also identified as COI; however, only total xylenes is retained for further evaluation because inclusion of the m&p- and o- isomers, in addition to total xylenes, would double-count results.

Table 2-11 indicates that the following constituents were detected at concentrations exceeding the risk-based protection of groundwater SSLs and are identified as migration to groundwater COI in soil of the Eastern Area: 1,1,1-trichloroethane, 1,1-dichloroethane, 1,2,4-trimethylbenzene, 1,2-dichloroethene, total, 1,3,5-trimethylbenzene, 1,4-dioxane, 2-hexanone, 4-isopropyltoluene, 4-methyl-2-pentanone, benzene, cis-1,2-dichloroethene, ethylbenzene, isopropylbenzene, m,p-xylenes, naphthalene, n-propylbenzene, o-xylene, sec-butylbenzene, styrene, tetrachloroethene, toluene, total xylenes, trichloroethene, vinyl chloride, benzo(a)pyrene, dalapon, arsenic, barium, cadmium, cobalt, iron, manganese, mercury, selenium, silver and titanium.

Tables 2-10 and 2-11 also indicate several constituents with maximum detection limits above the RSLs. The elevated detection limits are frequently due to elevated detections of other constituents in select samples that resulted in dilution of the sample and thus, high detection limits. The elevated detection limits are unlikely to affect the usability of the data, because as indicated in Appendix A-1, for most constituents there are several samples with detection limits below the RSLs while only a few exhibit the elevated detection limits. Furthermore, the majority of these constituents were either (1) already retained

as COI because the maximum detected concentration exceeded the screening value, or (2) excluded as COI because they were not detected at all in soil samples from the Eastern Area.

Specifically, as indicated in Table 2-10 the majority of constituents exhibiting elevated detections limits were not detected at all in soil samples from the Eastern Area. In addition, trichloroethene, vinyl chloride and arsenic were already identified as direct contact COI for the Eastern Area. Although 1,1,1-trichloroethane, 1,1-dichloroethane, 1,2-dichloroethane, 1,4-dichlorobenzene, 1,4-dioxane, benzene, and dibenz(a,h)anthracene exhibit elevated detection limits, they were not identified as COI for soil direct contact in other areas of the site; thus, these constituents were ultimately excluded as COI for direct contact.

As indicated in Table 2-11, detection limits for several VOCs and SVOCs exceed the migration to groundwater SSLs. Of these, the majority of the constituents were not detected at all or very infrequently in soil samples from the Eastern Area, or were already identified as COI. Further discussion of constituents with detection limits exceeding the screening values is provided in the Uncertainty Analysis (Section 6).

2.4.2 Constituents in Groundwater

For constituents in groundwater, the COI identification process is similar to that for soil. The maximum detected concentration of each constituent is compared with the RSL for Tapwater (USEPA, 2013a). As with soil RSLs, the Tapwater RSLs used in this assessment are generic values that are based on default exposure parameters and factors that represent reasonable maximum exposure conditions for chronic exposures. Specifically, the comparison values utilized are risk-based values which correspond to a 10^{-6} risk level for potential carcinogens and a HQ of 0.1 for non-carcinogens. The calculation of Tapwater RSLs takes into account ingestion of groundwater as drinking water and inhalation of volatiles from groundwater. Although groundwater at the site is not currently used as a source of drinking water, the Tapwater RSLs were used for screening purposes. Those constituents whose maximum detected concentrations were below the RSLs were eliminated as COI.

If RSLs were not available for a particular constituent, a surrogate value was selected for comparison based on constituents with structural similarity. In the absence of a Tapwater RSL for lead, the Federal Maximum Contaminant Level (MCL; USEPA, 2013a) was used. Similar to the approach used for soil, a comparison value for total chromium in groundwater was calculated based on the assumption that hexavalent and trivalent chromium are present at a ratio of 1:6 (Cr IV to Cr III), consistent with the ratio presented by USEPA (2013a). The tap water RSL values are 1600 ug/L for trivalent chromium and 0.031 ug/L for hexavalent chromium. Therefore, the site-specific Tapwater RSL for total chromium is calculated to be: (1,600 x 6) + (0.031) / 7 or 1,371 ug/L.

It should be noted that TPH-DRO was detected in several samples in onsite and downgradient groundwater. However, the heterogeneity of TPH fractions, and the uncertainty of their exact composition precludes evaluation of these constituents in a quantitative risk assessment. Therefore, a more reliable toxicological evaluation, based upon an evaluation of defined components of the TPH fractions (i.e., BTEX and PAHs, including naphthalene), was conducted. This approach is discussed in the uncertainty section (Section 6).

Screening was completed separately for onsite/downgradient groundwater data (both shallow and deep zones of the aquifer), and for upgradient groundwater data (shallow and deep zones). The results of the screening process are presented in Tables 2-12 through 2-14. For each constituent, these tables present the detection frequency, the minimum and maximum detected concentrations, the sample with the maximum detect, the minimum and maximum detection limits, and the Tapwater RSLs. The RSLs for non-carcinogenic constituents reflect a screening HQ of 0.1. The maximum detected concentration of each constituent in groundwater is compared to the RSL. Constituents that exceed the RSLs are identified as COI for groundwater.

Onsite Areas (Western, Central and Eastern) and Downgradient

Table 2-12 indicates that the following constituents were detected at concentrations exceeding the Tapwater RSLs and are identified as COI in shallow and deep zone groundwater from the onsite and downgradient areas: 1,1-dichloroethane, 1,2,4-trimethylbenzene, 1,2-dichloroethane, 1,3,5-trimethylbenzene, benzene, chloroform, cis-1,2-dichloroethene, ethylbenzene, isopropylbenzene, m&p-xylenes, methylene chloride, naphthalene, n-propylbenzene, o-xylene, tetrachloroethene, toluene, total xylenes, trichloroethene, vinyl chloride, 1-methylnaphthalene, mercury (total), lead (total), arsenic (total & dissolved), barium (total & dissolved), iron (total & dissolved), and manganese (total & dissolved).

Table 2-12 also indicates that several constituents have detection limits above the RSLs. This is partly due to elevated concentrations of other constituents that resulted in high detection limits. It is also due to the fact that many of the groundwater RSLs are lower than practical quantitation limits. Although the detection limits for some constituents exceed the screening values, these constituents were either (1) already retained as COI because the maximum detected concentration exceeded the screening value, or (2) excluded as COI because they were not detected at all or very infrequently in groundwater samples. For example, chlorobenzene and chloromethane were detected only two or three times in 170 samples.

The COI identified in shallow and deep zone groundwater from the onsite and downgradient areas were selected based on a comparison to Tapwater RSLs. An additional comparison of the groundwater concentrations to federal MCLs is provided in Table 2-13. This table was generated to allow consideration of the hypothetical future use of groundwater for drinking water purposes or as industrial process water.

Table 2-13 indicates that a subset of the COI identified above exceed the MCLs; these consist of 1,1-dichloroethene, cis-1,2-dichloroethene, ethylbenzene, methylene chloride, tetrachloroethene, trichloroethene, vinyl chloride, lead, arsenic, barium, and chromium.

Upgradient Area

Table 2-14 indicates that the following constituents were detected at concentrations exceeding the Tapwater RSLs and are identified as COI in upgradient groundwater from the shallow and deep zones: benzene, carbon tetrachloride, chloroform, cis-1,2-dichloroethene, naphthalene, tetrachloroethene and trichloroethene.

Many of these COI were also identified as COI for onsite/downgradient groundwater. As noted in the RFI (Cameron-Cole, 2005), the NIC site has widespread chlorinated hydrocarbon contamination in the groundwater. As determined from sampling during the RFI, constituents detected in groundwater migrating onsite from upgradient sources include concentrations of chlorinated hydrocarbon compounds and aromatic hydrocarbon compounds. The chlorinated hydrocarbon compounds detected in the most recent investigations include, most significantly, trichloroethene (detected in 36 out of 44 samples at concentrations up to 167 µg/L) and cis-1,2-dichloroethene (detected in 40 out of 44 samples at concentrations up to 34.2 µg/L).

Table 2-14 also indicates that several constituents have detection limits above the RSLs. This is partly due to elevated concentrations of other constituents that resulted in high detection limits. It is also due to the fact that many of the Tapwater RSLs are lower than practical quantitation limits. Although the detection limits for some constituents exceed the screening values, these constituents were either (1) already identified as COI because the maximum detected concentration exceeded the screening value, or (2) excluded as COI because they were not detected at all in upgradient groundwater samples.

2.4.3 Volatile Constituents in Indoor Air

Vapor intrusion from soil or groundwater to indoor air of current or future onsite buildings is a potential exposure route for the site. USEPA does not recommend modeling vapor concentrations from a soil source, especially if alternate media (e.g., groundwater or soil gas) have been sampled. Therefore, no further evaluation of vapor intrusion from soil is warranted. The vapor intrusion pathway is evaluated under a future scenario through the use of groundwater data from all three areas of the site. It should be noted that vapor intrusion for the Central Area is also evaluated through the use of soil gas data collected from beneath the foundation of Building E, and directly through the use of measured indoor air data collected inside Building E. Building E is currently occupied by administration personnel.

2.4.3.1 Vapor Intrusion from Groundwater and Soil Gas to Indoor Air

In order to evaluate vapor intrusion from onsite groundwater and soil gas under a current or future industrial scenario, screening levels were calculated using the USEPA (2013b) VISL Calculator Version 3.2. The VISL calculator is a spreadsheet tool that (1) lists chemicals considered to be volatile and known to pose a potential cancer risk or noncancer hazard through the inhalation pathway; (2) provides generally recommended screening-level concentrations for groundwater, soil gas (exterior to buildings and sub-slab), and indoor air for default target risk levels and exposure scenarios; and (3) allows calculation of site-specific screening levels based on user-defined target risk levels and exposure scenarios. The screening levels for groundwater and soil gas are calculated from the target indoor air concentrations using empirically-based conservative "generic" attenuation factors that reflect generally reasonable worst-case conditions as described in the USEPA's (2002b) draft vapor intrusion guidance. The default, generic VISLs are based on default exposure parameters and factors that represent RME conditions for long-term/chronic exposures. For this evaluation, commercial VISLs were calculated using a target HQ of 0.1, a target risk of 1×10^{-6}, and a system temperature for Kansas of 13.9 ° C.

The results of the screening process for onsite groundwater from all three areas of the site combined and soil gas from Building E in the Central Area of the site are presented in Tables 2-15 and 2-16, respectively. For each constituent, these tables present the detection frequency, the minimum and maximum detected concentrations, and the sample with the maximum detection, the minimum and maximum detection limits, and the applicable VISLs.

Constituents detected in the onsite groundwater are evaluated for potential vapor intrusion, and the results of the screening process are presented in Table 2-15. Table 2-15 lists only the detected organic constituents previously listed in Table 2-12; constituents that were not detected and constituents that are not organic are not retained for consideration of the vapor intrusion pathway. The maximum detected concentrations of constituents in onsite groundwater were compared to the groundwater VISLs, and constituents that exceed these values are identified as COI. Deep groundwater is not considered to be a significant source for vapor intrusion because the shallow zone groundwater may act as a vapor barrier to the deep groundwater. Regardless, data for both shallow and deep zones of the aquifer are combined for screening purposes. As presented in Table 2-15, 1,1-dichloroethane, ethylbenzene, tetrachloroethene, trichloroethene, and vinyl chloride are identified as COI for vapor intrusion from onsite groundwater. These constituents will be quantitatively evaluated in the risk assessment.

Although the detection limits for some constituents in onsite groundwater exceeded the screening values, these constituents were either (1) already retained as COI because the maximum detected concentration exceeded the screening value, or (2) excluded as COI because they were not detected at all or very

infrequently in groundwater samples. The vapor intrusion screening evaluation was not completed for upgradient groundwater for the following reasons: (1) upgradient concentrations do not reflect site sources to groundwater; and (2) no buildings are in the immediate vicinity of the upgradient groundwater wells.

The results of the screening process for soil gas from Building E are presented in Table 2-16. The maximum detected concentrations of constituents in soil gas were compared to the soil gas VISLs, and constituents that exceed these values are identified as COI. As presented in Table 2-16, no constituents were detected in soil gas above the respective VISLs.

2.4.3.2 Constituents in Indoor Air

Concentrations of constituents in indoor air were directly measured at two locations inside Building E of the Central Area of the site. In order to identify COI under a current scenario, indoor air concentrations are compared to the USEPA adjusted industrial air RSLs (USEPA, 2013a). The results of the screening process are presented in Table 2-17. For each constituent, this table presents the detection frequency, the minimum and maximum detected concentrations, the sample with the maximum detect, the minimum and maximum detection limits, and the residential soil RSLs. The RSLs reflect a screening HQ of 0.1 and a target potential risk of 1E-6. The maximum detected concentration of each constituent in indoor air is compared to the RSL. Constituents that exceed the RSLs are identified as COI for indoor air.

As presented in Table 2-17, 1,2,4-trimethylbenzene was detected in indoor air above the applicable RSL and is identified as a COI for indoor air.

2.4.4 Constituents in Sediment

For constituents in sediment of the East Fork of Chisholm Creek, the COI identification process consists of a comparison of the maximum detected concentration of each constituent with the applicable human health comparison values for sediment. Those constituents whose maximum detected concentrations were below the comparison values were eliminated as COI in sediment. In addition, constituents that were analyzed in sediment, but never detected, were eliminated as COI from the site-specific risk assessment.

The values used to evaluate constituents in sediment are the residential soil direct contact RSLs. The direct contact RSLs reflect a screening HQ of 0.1 and a target potential risk of 1E-6. These values were used in the absence of sediment comparison values specifically for human receptors. Since the residential soil values assume that a child would be exposed to soils on a daily basis (i.e. to be

representative of the most sensitive exposure scenario), these values are also applicable for exposure to sediment by any type of receptor since exposure will occur on a much less frequent basis.

If RSLs were not available for a particular constituent, surrogate screening values are selected based on constituents with structural similarity. In addition, because a residential soil RSL is not available for total chromium, a comparison value has been calculated based on the assumption that hexavalent and trivalent chromium are present at a ratio of 1:6 (Cr IV to Cr III), consistent with the ratio presented by USEPA (2013a). The residential soil RSL values are 12,000 mg/kg for trivalent chromium and 0.29 mg/kg for hexavalent chromium. Therefore, the site-specific RSL for total chromium is calculated to be: (12,000 x 6) + (0.29 x 1) / 7 or 10,286 mg/kg.

The results of the COI identification process for sediment in the East Fork of Chisholm Creek are presented in Table 2-18. For each detected constituent, this table presents the detection frequency, the minimum and maximum detected concentrations, the sample containing the maximum detected concentration, the minimum and maximum detection limits, and the sediment comparison values. The maximum detected concentration of each constituent in sediment is compared to the applicable comparison benchmark and constituents that exceed their comparison values are identified as COI for sediment.

As indicated in Table 2-18, benzo(a)pyrene, arsenic and lead are identified as COI for direct contact with sediment from the East Fork of Chisholm Creek.

2.4.5 Constituents in Surface Water

Low concentrations of site-related constituents were detected in the surface water samples collected from the East Fork of Chisholm Creek. To identify potential COI for the human health risk assessment, these concentrations are compared to the KDHE Surface Water Quality Standards (WQS) for Public Health (Domestic Water Supply) (KDHE, 2008). In the absence of a screening value from KDHE, the screening value is based on the USEPA Tapwater RSL (USEPA, 2013a).

The results of the screening process are presented in Table 2-19. For each constituent, this table presents the detection frequency, the minimum and maximum detected concentrations, the sample with the maximum detect, the minimum and maximum detection limits, and the KDHE WQS. No constituents in surface water were detected above the respective screening values and therefore no further evaluation for direct contact with surface water is warranted.

2.4.6 Summary of Constituents of Interest

Comprehensive summaries of the human health COI identified for each medium and exposure area are presented in Tables 2-20 through 2-23. In the following subsections, exposure pathways are evaluated for completeness, and COI for all complete pathways are evaluated in the quantitative risk assessment.

3.0 EXPOSURE ASSESSMENT

Exposure assessment is the process of measuring or estimating the intensity, frequency, and duration of human exposure to a constituent in the environment. This section of the risk assessment discusses the mechanisms by which people might come in contact with COI and the approximate magnitude, frequency, and duration of contact between potential human receptors and such constituents. The quantitative assessment of exposure, based on constituent concentrations and the degree of absorption of each constituent, provides the basis for estimating constituent uptake (dose) and associated health risks. The exposure assessment in this risk assessment follows the recommendations for conducting an assessment according to USEPA risk assessment guidance (1989) and the Guidelines for Exposure Assessment (USEPA, 1992a).

3.1 PATHWAYS OF HUMAN EXPOSURE

An exposure pathway describes the course that a constituent takes from its environmental source to a human receptor. Each exposure pathway includes the following elements: (1) a source or constituent release from a source, (2) an exposure medium (e.g., soil), (3) a point of potential contact for the receptor with the exposure medium (e.g., exposed surface soil), and (4) an exposure route at the contact point (e.g., incidental ingestion, dermal contact). An exposure pathway is considered complete when all of these elements are present.

Once constituents are released into an environmental medium, they may migrate from one medium to another. Complete exposure pathways are those that involve receptor contact with an environmental medium that contains elevated levels of site-associated constituents. The complete exposure pathways for the site are identified below. Only complete exposure pathways are evaluated quantitatively in the risk assessment.

3.1.1 Potential Exposure Media and Routes of Exposure

This risk assessment provides an evaluation of soil, groundwater, indoor air, sediment and related exposure pathways.

Soil - Direct Contact: COI for direct contact with soil have been selected based on the analytical data and the screening approach undertaken in Section 2.4. For receptors with potential to directly contact site soils, incidental ingestion of constituents in soil and dermal contact with constituents in soil are the standard exposure routes that are assessed.

Soil-to-Air Volatile Emissions: Volatile constituents present in soil can be released to ambient (outdoor) air through volatilization or to indoor air via vapor intrusion. Potential receptors are exposed to volatiles in air via the inhalation route. Several volatile COI in soil have been identified for each onsite area. Therefore, inhalation of volatile constituents in ambient air is a complete exposure pathway for the site.

Soil-to-Air Particulate Emissions: Constituent-containing soil particulates could be transported to ambient air by wind erosion or construction activities. Inhalation of particulate emissions is considered a potentially complete exposure route for all COI.

Soil Migration to Groundwater: Constituents in soil have the potential to migrate to groundwater. Several constituents in onsite soil were detected at concentrations above the soil migration to groundwater screening values. The potential for COI to migrate from soil to groundwater has been addressed by direct sampling of groundwater. In addition, the soil migration to groundwater pathway is not evaluated quantitatively because substantial groundwater data are available for the site, and these provide a sufficient amount of information to evaluate current and future groundwater conditions.

Groundwater (Direct Contact): COI were identified in groundwater associated with the site. As noted in Section 2.1, a City of Wichita ordinance is in place that prohibits installation of groundwater wells for personal use (e.g., drinking) within the NIC. Furthermore, a formalized restrictive covenant will be completed for the site, prohibiting all uses of groundwater. It is recognized that the State of Kansas has determined this aquifer to be a drinking water aquifer, and therefore the groundwater must ultimately be returned to drinkable quality. All groundwater use pathways are currently incomplete. Hypothetical future uses of groundwater, including the use of groundwater as drinking water and the use of groundwater as process water or dewatering wells for construction purposes, are considered potentially complete. While it is possible for a construction worker to excavate to the saturated zone at some sites, shallow groundwater at the site is present at depths ranging from 12 to 16 feet below ground surface. Generally, the depth of excavations would not exceed 10 feet; therefore, the potential for a worker to accidentally contact shallow groundwater is considered to be negligible.

Groundwater (Inhalation of Volatiles): Volatile constituents present in groundwater could migrate through the soil and into indoor air via vapor intrusion. Because volatile COI were identified for vapor intrusion from groundwater, this pathway is considered potentially complete. Potential receptors are exposed to volatiles in indoor air via the inhalation route.

Sediment Water (Direct Contact): COI have been identified in sediment of the East Fork of Chisholm Creek. For receptors with potential to directly contact sediment, incidental ingestion and dermal contact are the standard exposure routes that are assessed.

Surface Water (Direct Contact): No COI have been identified in surface water of the East Fork of Chisholm Creek. Therefore exposure due to this pathway is considered to be de minimis, and no further evaluation of this pathway is warranted.

3.1.2 Potential Receptors

The potential human receptors at a site must be characterized in order to evaluate potential exposure pathways. The site is an active industrial facility; therefore, potential receptors are identified based on the assumptions that current and future land use is non-residential. The following potential receptors were evaluated for the site:

- Outdoor Worker
- Indoor Worker
- Construction Worker
- Site Visitors
- Recreational Visitors

The most common receptors for the site are outdoor and indoor workers. The site workers are assumed to be full-time employees who would be present on a daily basis. The outdoor worker is assumed to spend the majority of the work day outdoors, and is not expected to be involved in any intrusive activities (e.g. excavation). Therefore, the outdoor worker is evaluated for direct exposures to surface soil (incidental ingestion, dermal contact, and inhalation of particulate and volatile emissions). These exposure pathways are considered to be potentially complete under both current and future land use scenarios.

The indoor worker is assumed to spend the entire work day indoors, and could potentially be exposed via inhalation of volatile constituents in indoor air that migrate from soil or from shallow groundwater. This exposure pathway is considered to be potentially complete under both current and future land use scenarios. Groundwater is not used for any purpose currently. Under a hypothetical future groundwater use scenario only, direct contact with groundwater used for drinking or as process water may occur. Because constituents in groundwater were detected at concentrations above federal MCLs, these hypothetical future groundwater use exposure pathways may result in unacceptable risk and would require additional evaluation if exposure was anticipated (e.g., if a well were installed). As previously indicated, deep groundwater is not considered to be a significant source for vapor intrusion because shallow zone groundwater may act as a vapor barrier to the deep groundwater. The indoor worker may

also potentially be exposed to indoor dust derived from outdoor soil. However, evaluation of the outdoor worker scenario provides a much more conservative assessment of exposure to site soils. Therefore, evaluation of exposure to indoor dust derived from outdoor soil is not completed in the quantitative assessment.

Construction workers, excavation workers, and utility repair workers are all receptors that may be involved in intrusive activities, and have the potential to contact both surface and subsurface soils at the site. Exposure routes consist of incidental ingestion of soil, dermal contact with soil, and inhalation of particulate and volatile emissions. These exposure pathways are considered to be potentially complete under both current and future land use scenarios. Under a future use scenario only, direct contact with groundwater used as process water may be a potentially complete pathway. Construction workers are assumed to be present at the site only for occasional, short-term projects.

As previously mentioned, a City of Wichita ordinance (Ord. No. 43-156 S 2) is in place that prohibits installation of groundwater wells for personal use (e.g., drinking) within the NIC. Furthermore, a formalized restrictive covenant will be completed for the site, prohibiting all uses of groundwater. It is recognized that the State of Kansas has determined this aquifer to be a drinking water aquifer, and therefore must ultimately be returned to drinkable quality. However, due to the restrictive covenant, all groundwater use pathways are currently incomplete. Future uses of groundwater, including use as process water or dewatering wells for construction purposes, are considered potentially complete. While it is possible for a construction worker to excavate to the saturated zone at some locations, shallow groundwater at the site is present at depths ranging from 12 to 16 feet below ground surface. Generally, the depth of excavations would not reach the shallow aquifer; therefore, the potential for a construction worker to accidentally contact shallow groundwater is considered to be negligible.

Onsite visitors to the site may also be exposed to COI via the same exposure routes as the workers. However, the magnitude of exposure of these receptors would be significantly less than workers, and in some cases (such as contact with subsurface soil), would not occur at all. Therefore, only the worker receptors are retained for the quantitative risk evaluation of onsite areas.

It is possible that recreational receptors, including adults and youth (ages 7 to 16), may hike or play in the East Fork of Chisholm Creek near the site. The recreational receptors are evaluated for potential direct contact (incidental ingestion and dermal contact) with COI in sediment.

3.1.3 Complete Exposure Pathways

Complete exposure pathways require exposure media with elevated levels of site-associated constituents, and receptors with the opportunity to contact these media. The previous sections described

the potential exposure pathways for the site under current and future land use conditions, as well as the likely human receptors. Figure 3-1 provides a summary of the receptors and potential exposure pathways, and whether each pathway is complete. Exposures resulting from all complete pathways are quantitatively evaluated in this assessment.

3.2 QUANTIFICATION OF EXPOSURE POINT CONCENTRATIONS

Potential exposure to constituents in the environment is directly proportional to the concentrations of constituents in environmental media (e.g., soil) and characteristics of exposure (e.g., frequency and duration). The concentrations at exposure points generally are referred to as exposure point concentrations (EPCs). The analytical results for samples from a given area are combined to derive a single EPC for each constituent that conservatively represents the level of that constituent to which potential receptors may be exposed. For constituents in soil, groundwater, indoor air and sediment, EPCs were statistically calculated from sampling data. EPCs for volatile and particulate emissions from soil to ambient air are estimated using USEPA (2002a) methodologies. EPCs for volatile constituents in indoor air (vapor intrusion from groundwater) are also estimated using the Johnson and Ettinger (1991) vapor intrusion model and the USEPA's guidance for using this model (USEPA, 2004a).

3.2.1 Exposure Point Concentrations Based on Measured Data

EPCs generally are estimated using measured concentrations in environmental media, or estimated based on fate and transport models. Depending on the distribution of the data, the proportion of the samples reported as non-detect, and the total number of samples, there are several statistical parameters that may be used to estimate EPCs. USEPA supplemental risk assessment guidance (USEPA, 1992c) stipulates that the EPC estimates should be based on the 95% upper confidence limit (95% UCL) of the arithmetic mean to estimate a Reasonable Maximum Exposure (RME) scenario. RME conditions are defined by USEPA as the "highest exposure that is reasonably expected to occur at the site." In this assessment, the UCL is used to evaluate all COI except for lead. As will be discussed in Section 4.4, lead is evaluated using a separate type of model, and the EPC required for this model is the arithmetic mean concentration.

In this assessment, the USEPA (2011b) software package, ProUCL Version 4.1.01, is used to calculate statistics. This program allows for statistical calculations on data sets with or without non-detect results. For data sets without non-detect results, statistics are simply calculated on the full data set. For data sets with non-detect results, regression on order statistics (ROS) are used to extrapolate non-detect observations based on the distribution of the data set. Prior to calculating any statistics, duplicate samples were appropriately averaged as discussed in Section 2.3.

The first step in the data evaluation process is to determine the best fit distribution of the data (USEPA, 2011b). Untransformed data are tested first to determine if the distribution is normal at α = 0.05. If they are normally distributed, the appropriate statistics for normal data are used. If the data are not normal, the data are log-transformed and retested for lognormality at α = 0.05. USEPA (2011b) also provides methods to test for Goodness of Fit to the Gamma distribution, and indicates that the Gamma distribution is prioritized over the lognormal distribution. A distribution which is neither normal, Gamma, nor lognormal is defined as a non-parametric distribution. The non-parametric Kaplan-Meier (KM) method is the preferred method for evaluating data sets with multiple detection limits.

ProUCL Version 4.1.01 was run on the data sets for COI from each medium and area. The output is provided in Appendix B. The output files provide detailed information on statistics generated for each distribution type, and also identify the recommended UCL ("Potential UCL to Use"). The final EPC is identified as the lower of the UCL or the maximum detected concentration for all COI except for lead. As will be discussed in Section 4.4, lead is evaluated using a separate type of model, and the EPC required for this model is the arithmetic mean concentration. It should be noted that for some data sets, too few distinct detected values were observed. In these cases, statistics for that data set were not generated, and the maximum detected concentration is selected as the final EPC.

3.2.1.1 Exposure Point Concentrations for Constituents in Soil

EPCs for COI in soil of each exposure area are presented in Tables 3-1 through 3-6. For each area, the available surface soil data are used to evaluate the outdoor worker. All available surface plus shallow subsurface soil data to a maximum depth of 15 feet are used to evaluate the construction worker. The final EPC is identified as the lower of the UCL or the maximum detected concentration for all COI except for lead. Lead was identified as a COI in the Central and Eastern Areas and the EPC for lead is based on the arithmetic mean concentration. Details of all statistical calculations are provided in Appendix B-1-1 (for surface soil) and B-1-2 (for surface and shallow subsurface soil) for the Western Area; Appendix B-2-1 (for surface soil) and B-2-2 (for surface and shallow subsurface soil) for the Central Area; and Appendix B-3-1 (for surface soil) and B-3-2 (for surface and shallow subsurface soil) for the Eastern Area.

3.2.1.2 Exposure Point Concentrations for Constituents in Onsite Groundwater

The only complete pathway for groundwater included in this risk assessment is vapor intrusion from onsite shallow groundwater. To more specifically evaluate potential source areas for vapor intrusion, EPCs for shallow groundwater were calculated separately for the Western Area, Central Area, and the Eastern Area. The EPCs for constituents in shallow groundwater from each area are presented in Tables 3-7 through 3-9. The final EPC is identified as the lower of the UCL or the maximum detected concentration. The EPCs presented in Tables 3-7 through 3-9 are used as source concentrations for the

vapor intrusion modeling. Details of all statistical calculations are provided in Appendices B-4 through B-6.

3.2.1.3 Exposure Point Concentrations for Constituents in Indoor Air

Because of the small number of samples, the EPCs for indoor air are represented by the maximum detected concentration from all samples. EPCs for constituents in indoor air are presented in Table 3-10.

3.2.1.4 Exposure Point Concentrations for Constituents in Sediment

The EPCs for COI in sediment of the East Fork of Chisholm Creek are presented in Table 3-11. All sediment data were used to evaluate the recreational receptors. EPCs were based on the lower of the UCL or the maximum detected concentration for all COI except for lead. As noted previously, the EPC for lead is based on the arithmetic mean concentration. Details of the statistical calculations are provided in Appendix B-7.

3.2.2 Exposure Point Concentrations for Particulates in Ambient Air

The concentrations of COI associated with particulate emissions were estimated using a particulate emission factor (PEF). The PEF relates the concentration of a constituent in soil to the estimated concentration in respirable airborne particulates. For this assessment, separate PEFs were calculated to evaluate the outdoor worker (inhalation of particulate emissions generated by wind erosion) and the construction worker (inhalation of particulate emissions generated by construction activities).

The PEF used to evaluate the outdoor worker is calculated based on Equation 4-5 and the default values from USEPA (2002a). The value for Q/C_{wind} is based on a two-acre source size (an approximate average for each of the three onsite areas of the Clean Harbors site) and using the meteorological data for Lincoln, NE (the closest city to Wichita in Zone V using Exhibit D-1 from USEPA [2002a]). The equation and input factors are presented in Table 3-12. As presented in this table, the resulting calculated PEF is 9.38E+8 m^3/kg. Soil concentrations are converted to air concentrations by dividing the soil concentration (CS) by the PEF to obtain an air concentration (CA) in units of mg/m^3. The calculated PEF is applied to surface soil concentrations to estimate particulate concentrations that might be inhaled by an outdoor worker. The soil source concentrations for each area, the PEF and the resulting concentrations in ambient air are presented in Table 3-13.

The subchronic PEF used to evaluate the construction worker is calculated based on Equation 5-5 from USEPA (2002a). The value for Q/C_{sr} is based on a two-acre source size and using Equation 5-6 from USEPA (2002a). The dispersion correction factor (F_D) is calculated from Equation E-16 of USEPA (2002a) assuming a construction project duration of 3,024 hours (24 hrs/day for 126 days), while the total

time over which construction occurs (T) is based on 8 hrs/day and 90 days/year of active construction activity. The construction surface area (A_R) is based on the assumption that a road is built through the center of the site; therefore a road length of 300 ft (approximate width for each of the three onsite areas of the Clean Harbors site) and road width of 30 ft have been used in the calculation. The mean vehicle weight (W) is based on an assumption that traffic consists of twenty 2-ton cars and ten 20-ton trucks. The number of days with at least 0.01 inches of precipitation (p) was estimated to be 90 days, based on Exhibit 5-2 of USEPA (2002a). Finally, the sum of fleet vehicle kilometers traveled during the exposure duration was estimated to be 246.8 km, based on the assumption that each vehicle travels the length of the road once per day for 90 days. The subchronic PEF equation and input factors are presented in Table 3-14. As presented in this table, the resulting calculated PEF_{sc} is 5.87E+6 m^3/kg. The PEF_{sc} is applied to the combined surface and subsurface soil concentrations to estimate particulate concentrations that might be inhaled by the construction worker. The soil source concentrations for each area, the PEF and the resulting concentrations in ambient air are presented in Table 3-15.

3.2.3 Exposure point Concentration for Volatiles in Ambient Air

The concentrations of COI associated with volatilization from soil to outdoor air were estimated using a volatilization factor (VF). The VF relates the concentration of a constituent in soil to the estimated concentration in ambient air. This assessment calculates constituent-specific VFs for each COI based on equations from USEPA's (2002a) soil screening guidance document.

The calculation of a VF incorporates default soil properties (porosity values, densities, and organic carbon) and chemical-specific properties (Henry's Law constants, diffusivity coefficients). The soil properties are based on USEPA (2004a) default values for a "clay loam" soil type. This soil type was selected as representative of the site, based on site boring logs and a description in the RFI Report (Cameron-Cole, 2005) that unsaturated soils are predominantly "gravelly clay and silt". The fraction organic carbon used in the model is the KDHE (2010) default value of 0.01 g/g. The constituent-specific properties were obtained from USEPA (2004a) guidance. The values for the Henry's Law constants at the system temperature (H'_{TS}) were converted from Henry's Law constants at 25°C assuming a soil temperature of 13.9°C [average value for Kansas, based on Figure 8 of USEPA (2004a)] and using equations provided by USEPA (2004a).

The VFs used to evaluate the outdoor worker are calculated based on Equation 4-8 and the default values from USEPA (2002a). The value for Q/C_{vol} is based on a two-acre source size (an approximate average for each of the three onsite areas of the Clean Harbors site) and using the meteorological data for Lincoln, NE (the closest city to Wichita in Zone V using Exhibit D-1 from USEPA [2002a]). The equation, input factors, and resulting calculated constituent-specific VFs are presented in Table 3-16.

Soil concentrations are converted to air concentrations by dividing the soil concentration (CS) by the VF to obtain an air concentration (CA) in units of mg/m^3. The VFs are applied to surface soil concentrations in each area to estimate volatile concentrations for the outdoor worker. The surface soil source concentrations for each area, the VFs and the resulting concentrations in ambient air are presented in Table 3-17.

The VFs used to evaluate the construction worker are calculated based on Equation 5-14 from USEPA (2002a). The total time over which construction occurs (T) is based on 8 hrs/day and 90 days/year of active construction activity. The value for Q/C_{sa} is based on a two-acre source size and using Equation 5-15 from USEPA (2002a). The dispersion correction factor (F_D) is calculated from Equation E-16 of USEPA (2002a) assuming a construction project duration of 3,024 hours (24 hrs/day for 126 days). The subchronic VF equation, input factors, and resulting calculated constituent-specific VF_{sc}s are presented in Table 3-18.

The VF_{sc}s for the construction scenario are applied to the combined surface and subsurface soil concentrations for each area to estimate volatile concentrations for the construction worker. The soil source concentrations for each area, the VF_{sc}s and the resulting concentrations in ambient air are presented in Table 3-19.

3.2.4 Exposure Point Concentrations for Volatiles in Indoor Air

The concentrations of COI in indoor air associated with volatile emissions from shallow groundwater were estimated using methodologies outlined in the User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings (USEPA, 2004a). The first step in determining air concentrations from groundwater source concentrations is to convert the source concentration to a soil gas concentration. When groundwater is the source, assuming that the vapor and aqueous-phases are in local equilibrium, the soil gas concentrations (C_{SG}) are calculated according to Henry's Law in the following manner (USEPA, 2004a):

$$C_{SG} = C_{GW} \times 1000\ L/m^3 \times H'_{TS}$$

Where C_{GW} is the exposure point concentration (in mg/L) and H'_{TS} is the unitless Henry's Law Constant at the system temperature (13.9°C for Kansas, as noted above). Tables 3-20 through 3-22 present the calculated soil gas source concentrations for COI in onsite shallow groundwater for the Western Area, the Central Area and the Eastern Area, respectively.

The next step in calculating the indoor air concentration is to estimate a transport factor (TF_{ind}) that will relate the constituent concentration in soil gas to the concentration in air. The TF_{ind} is dependent on the diffusion coefficient and other properties that will affect the transfer of constituents into air, such as

distance from the source to the breathing zone, soil properties, and building properties. For indoor air, the TF_{ind} is calculated in accordance with the conservative default values and equations presented in the USEPA (2004a) User's Guide. Details of the TF_{ind} calculations are provided in Appendix C.

Soil gas concentrations are converted to air concentrations by applying the transfer factor as follows:

$$C_A = C_{SG} \times TF_{ind}$$

The constituent-specific TF_{ind} for indoor air, along with the resulting estimated concentrations of COI indoor air, are presented in Tables 3-20 through 3-22 for vapor intrusion from onsite shallow groundwater in each area of the site.

3.3 ESTIMATION OF CONSTITUENT EXPOSURE AND INTAKE

The USEPA's Guidelines for Exposure Assessment (USEPA, 1992a) define constituent exposure as "the condition of a chemical contacting the outer boundary of a human." The constituents are contained in an environmental medium such as water, soil, or air. Generally two steps are required for a constituent to enter a body; contact with the outer boundary of the body (exposure) and then crossing the boundary from outside to inside the body (intake). For most exposure routes, intake is evaluated in terms of how much of the carrier medium containing the constituents crosses the outer boundary (e.g., amount of soil ingested, volume of air inhaled).

Two types of doses, applied and internal, are defined for evaluating constituent exposure (USEPA, 1992a). The applied dose is the amount of a constituent present at an absorption barrier (e.g., lung, skin, gastrointestinal tract) and available for absorption. The applied dose is estimated as the amount of constituent ingested, inhaled, or contained in material contacting the skin. This is analogous to the administered dose in a dose-response experiment. The internal dose is the amount of constituent actually absorbed across the barrier and available for internal biological interactions. It is the portion of the internal dose that actually reaches cells, sites, or membranes where adverse effects occur. Doses are generally presented as dose rates (dose per unit time) on a per-unit-body-weight basis (units of mg/kg-day).

Noncarcinogenic health effects are evaluated by calculating the average dose of a constituent over the course of the exposure period. This dose is termed the Average Daily Dose (ADD). Potential carcinogenic health effects are evaluated in terms of an individual's theoretical increased risk of developing cancer over a lifetime. Although the duration of exposure to a constituent release generally does not last for an entire lifetime, constituent intake for carcinogens is estimated as the average dose over a human lifetime (70 years). This lifetime dose applies specifically to the evaluation of carcinogenic effects, and is termed the Lifetime Average Daily Dose (LADD). In a risk assessment, the calculated ADD or LADD are

estimated quantitatively using assumptions about the duration, frequency, and magnitude of exposure experienced by each potential receptor, and using assumptions about the constituent properties that influence absorption. Table 3-23 presents the general form of the equation used to evaluate intake of constituents.

3.4 ESTIMATION OF CONSTITUENT ABSORPTION

3.4.1 Gastrointestinal Bioavailability

As noted above, the amount of a constituent that actually penetrates the exchange boundaries of the organism is termed the internal dose (sometimes called absorbed dose). The toxicity studies that provide the basis for derived constituent health effects values (references doses and cancer slope factors) generally report health effects as a function of applied doses rather than internal doses. These values are therefore most correctly compared to calculations of potential applied doses. However, toxicity studies often provide constituents to the study animals in food, in water, or in a matrix that readily allows absorption. The fraction of a constituent that is absorbed from soil is generally less than the fraction absorbed from food or drinking water. USEPA guidance indicates that reference doses (RfDs) are usually based on or have been adjusted to reflect drinking water exposure (USEPA, 1989). Constituents contained in other environmental media, such as soil, are likely to be absorbed to a lesser degree than occurs in a toxicity study or is inherent in a water-based RfD.

The extent of gastrointestinal bioavailability depends on the properties of the constituent and the properties of the matrix with which it is ingested. This risk assessment includes the evaluation of soil and sediment ingestion pathways. For both exposure routes, an oral absorption factor of 100 percent was used for all COI except for arsenic. USEPA recommends a default relative bioavailability value for ingestion of arsenic of 60% (USEPA, 2012).

3.4.2 Dermal Absorption of Constituents from Soil and Sediment

The administered dose in a dermal exposure pathway is the amount of constituent in the volume of soil or sediment contacting the skin. Only a small fraction of this amount will actually penetrate the skin and enter the body of a receptor. Dermal exposure calculations are, therefore, always calculated as an absorbed dose, and require the inclusion of a dermal absorption fraction (DAF). The DAF values are based on guidance from USEPA (2004, 2013a), and the values are presented in Table 3-24.

USEPA (2004b) guidance indicates that there are no default dermal absorption values presented for volatile organic compounds in the considered soil exposure scenarios, because volatile organic compounds would tend to be volatilized from the soil on skin and should be accounted for via inhalation

routes in the combined exposure pathway analysis. Therefore, the DAF for VOCs (1,2,4-trimethylbenzene, ethylbenzene, tetrachloroethene, total xylenes, trichloroethene and vinyl chloride) are set to zero (i.e., these constituents are not evaluated for the dermal contact with soil pathway). For benzo(a)pyrene and naphthalene the default dermal absorption fraction of 13% (0.13) is incorporated into the dose equations. For MCPP and toxaphene the DAF is 10% (0.10) and for arsenic, the DAF is 3% (0.03). Lead absorption is discussed separately in Section 4.4.

3.5 EXPOSURE ASSUMPTIONS

The quantitative estimation of constituent intake involves the incorporation of numerical assumptions for a variety of exposure parameters. Where guidance was available, exposure assumptions used in these intake calculations are based on USEPA (2002a, 2013a) recommended values. Some exposure values are not addressed in the available guidance, and, in these cases, values were derived based on site characteristics or best professional judgment. All exposure assumptions utilized in this risk assessment are described below.

3.5.1 All Pathways

The following factors are consistent across all of the exposure pathways considered in this assessment for each receptor.

3.5.1.1 Exposure Frequency and Duration

Each receptor in this assessment is assumed to have a particular frequency and duration of exposure.

Outdoor and Indoor Worker: USEPA (2002a, 2013a) guidance recommends an exposure duration of 25 years and an exposure frequency of 225 days/year for an outdoor worker exposed via soil-related pathways. For the indoor worker, the recommended USEPA (2002a, 2013a) exposure duration of 25 years and exposure frequency of 250 days/year are used.

Construction Worker: The construction worker is assumed to be present for a one-time project of limited duration (18 weeks), so an exposure duration of 1 year and an exposure frequency of 90 days (five days per week) have been selected.

Recreational Receptors: Recreational receptors are estimated to visit the site once a week during the non-winter months, for an exposure frequency of 39 days/year. The exposure duration for the recreational adult is based on default values for an adult resident; therefore, a value of 30 years is used for the recreational adult. The exposure duration for the recreational youth (ages 7 through 16) is based on the number of years for this age range (10 years).

3.5.1.2 Body Weight

The default value for average body weight of an adult is 70 kg based on USEPA (2002a, 2013a). This value was used for the body weight of the worker receptors and the recreational adult. The body weight for a youth between the ages of 7 and 16 years is approximately 44.3 kg. This value was calculated as the mean body weight for males and females ages 6 up to 11 and 11 up to 16 (USEPA, 2011a).

3.5.1.3 Averaging Time

As described above, the doses for noncarcinogenic health effects are averaged over the specific period of exposure for a given receptor. Noncarcinogenic averaging times are, therefore, calculated by multiplying the exposure duration for the receptor by 365 days/year. Carcinogenic health effects are calculated over a lifetime exposure, so the USEPA (2002a, 2013a) value for average lifetime, 70 years, was used for exposure duration. The resulting carcinogenic averaging time is 25,550 days.

3.5.2 Incidental Ingestion of Soil or Sediment

The factors incorporated into calculations of the soil and sediment ingestion pathways are discussed in this section. Exposure factors for the outdoor worker, the construction worker and the recreational receptors are presented in Table 3-25. The equations used to calculate intake (represented as ADD and LADD) for this pathway are also presented in this table.

Soil/Sediment Ingestion Rate. The USEPA (2002a, 2013a) recommended default value of 100 mg/day is used to estimate soil ingestion for the outdoor worker. For workers involved in short-duration construction or excavation projects, the soil ingestion rate of 330 mg/day was used (USEPA, 2002a, 2013a). In the absence of specific values for receptors exposed to sediments, the outdoor worker rate of 100 mg/day is also used to conservatively evaluate incidental sediment ingestion for the recreational receptors.

Gastrointestinal Bioavailability Factor. As described in Section 3.4.1, a relative gastrointestinal bioavailability factor is included in calculations of the soil ingestion pathway. A conservative value of 100% was used in this assessment for all constituents except for arsenic. A relative bioavailability of 60% is recommended for arsenic (USEPA, 2012).

3.5.3 Dermal Contact with Soil or Sediment

The factors discussed below are incorporated into calculations of the dermal contact with soil and sediment pathways. Exposure factors for the outdoor worker, the construction worker and the recreational receptors are presented in Table 3-26. The equations used to calculate intake (represented as ADD and LADD) for this pathway are also presented in this table.

Skin Surface Area. Potentially exposed workers are assumed to wear appropriate clothing during outdoor activities that may involve soil contact, such as long sleeve shirts and long pants. Skin surface area available for dermal contact with soil is assumed to be the hands, forearms, and head. The exposed skin surface area corresponding to these body parts is approximately 3,300 cm^2, based on guidance from USEPA (2002a, 2013a). For the recreational adult, the skin surface area was set to 5,700 cm^2, based on the default value presented by USEPA (2002b) for a residential adult exposed to soil. For the recreational youth, the skin surface area available for dermal contact with sediment is assumed to be the face, forearms, hands and lower legs. The exposed skin surface area corresponding to these body parts is approximately 3,780 cm^2, based on mean values provided by USEPA (2011a) for males and females ages 6 up to 11 and 11 up to 16.

Soil Adherence Factor. The soil adherence factor describes the amount of soil or sediment that is assumed to be in contact with the exposed skin surface area. USEPA guidance (2002a) provides values for a variety of receptors. A value 0.2 mg/cm^2 is recommended for an outdoor industrial worker, and a value 0.3 mg/cm^2 is recommended for a construction worker. In the absence of specific factors for sediment, the default residential soil adherence factors were used for the recreational adult and youth (0.07 mg/cm^2 and 0.2 mg/cm^2, respectively).

Dermal Absorption Fraction. As described in Section 3.4.2, a dermal absorption fraction is included in calculations of exposure to constituents in soil and sediment through dermal contact. These values are based on guidance from USEPA (2004b, 2013a), and were presented in Table 3-24.

3.5.4 Particulate and Volatile Inhalation

In accordance with USEPA's "Supplemental Guidance for Inhalation Risk Assessment" (USEPA, 2009a), an intake factor is not calculated for the inhalation pathway. USEPA recommends that when estimating risk via inhalation, the concentration of the constituent in air should be used as the exposure metric (e.g., mg/m^3), rather than inhalation intake of the constituent in air based on inhalation rate and body weight (e.g., mg/kg-day). Thus, instead of a dose calculation, an exposure concentration is calculated for each receptor.

The following factors are incorporated into calculations of inhalation exposure for volatile emissions in ambient and indoor air. Exposure factors for all worker receptors are presented in Table 3-27. The general calculation for the exposure concentration is also presented in this table.

Exposure Time: The exposure time for the worker receptors is 8 hours per day. This is the recommended value for a typical workday (USEPA, 2013a).

Averaging Time: The averaging times for the worker receptors are the same as those discussed previously in Section 3.6.1.3. However, in the calculation of exposure concentration, the averaging time is expressed in units of hours (USEPA, 2009a).

3.6 SUMMARY

The calculations of estimated doses for the complete exposure pathways identified in this section are presented in Appendix D. These dose estimates are combined in the risk characterization (Section 5) with the toxicity values presented in the Toxicity Assessment (Section 4) to estimate potential carcinogenic risks and noncarcinogenic effects.

4.0 TOXICITY ASSESSMENT

The toxicity assessment, also known as the dose-response assessment, provides a description of the relationship between a dose of a constituent and the anticipated incidence of an adverse health effect. The majority of existing knowledge about the dose-response relationship is based on data collected from studies of animals (usually rodents), studies of human occupational exposures, and theories about how humans respond to environmental doses of constituents.

The USEPA has developed dose-response assessment techniques to set "acceptable" levels of human exposure to constituents in the environment. These USEPA-derived risk values address both subchronic and chronic noncarcinogenic health effects, and potential carcinogenic health risks.

4.1 EVALUATION OF NONCARCINOGENIC RESPONSES

The sections that follow discuss the mechanisms of noncarcinogenic response, the derivation of acceptable dose levels, the manner in which these levels are used in this risk assessment, and some of the limitations of these values. The limitations are addressed in greater detail in the Uncertainty Analysis section of this report (Section 6).

4.1.1 Background

It is widely accepted that noncarcinogenic biological effects of constituents occur only after a threshold dose is achieved (Klaassen, 2001). Typically, physiological mechanisms exist that will minimize the adverse effect, through pharmacokinetic means such as absorption, distribution, excretion, or metabolism (Klaassen, 2001). Therefore, a range of exposures and resulting doses exist that can be tolerated by a receptor with essentially no chance of developing adverse effects. The threshold dose for a constituent is usually estimated from the no observed adverse effect level (NOAEL) or the lowest observed adverse effect level (LOAEL), as determined from animal studies or human data. The NOAEL is the highest dose at which no adverse effects occur, while the LOAEL is the lowest dose at which adverse effects are discernable.

4.1.2 Noncarcinogenic Toxicity Values

USEPA uses the NOAEL or LOAEL estimates of threshold dose to establish reference doses (RfDs) and reference concentrations (RfCs) for human exposure. An RfD or RfC is an estimate of a daily exposure level (dose) that is unlikely to present an appreciable risk of deleterious effects during a lifetime. USEPA has derived RfDs and RfCs for both chronic (long-term) and subchronic (short-term) exposure periods. For this assessment, subchronic RfDs/RfCs have been used (when available) to evaluate the

construction worker. RfDs (used to evaluate the oral exposure route) are expressed in units of dose (mg/kg-day), while RfCs (used to evaluate the inhalation exposure route) are expressed as concentrations (mg/m^3). Both types of toxicity values incorporate uncertainty factors to account for limitations in the quality or quantity of available data. RfDs for the dermal route of exposure are developed through route-to-route extrapolation, as described by USEPA (2004b). An oral RfD is converted to an absorbed dose by multiplying the RfD by the fractional absorption value. As indicated Exhibit 4-1 of USEPA (2004b) and also presented in the Chemical-Specific Parameters Supporting Table (USEPA, 2013a), fractional absorption efficiency factors of 100% are recommended for all COI at the site.

4.1.3 Estimating the Likelihood of Adverse Noncarcinogenic Response

The likelihood of occurrence of adverse noncarcinogenic effects depends on the relationship between the RfD (or RfC) and the estimated average constituent dose (or exposure concentration) received by the receptor. Doses less than the RfD (and exposure concentrations less than the RfC) are not likely to be associated with any adverse health effects and are, generally, not of regulatory concern. Doses that exceed the RfD (and exposure concentrations that exceed the RfC) are considered to present the potential for adverse effects.

Noncarcinogenic responses are evaluated numerically using parameters known as the hazard quotient (HQ) and hazard index (HI). For oral and dermal exposure routes, the HQ is obtained by dividing the average daily dose (ADD) by the RfD as presented below. The ADD is the estimated daily dose of a constituent averaged over the specific duration of exposure, which may not necessarily be an entire lifetime.

$$ADD \div RfD = HQ$$

The ADD is the estimated daily dose of a constituent averaged over the specific duration of exposure, which may not necessarily be an entire lifetime. The equations for calculating the ADD were presented in Tables 3-25 and 3-26.

Similarly, for the inhalation exposure route, the HQ is calculated by dividing the exposure concentration by the RfC. The equation for calculating the EC for inhalation pathways was presented in Table 3-27. The exposure concentration is calculated by applying the receptor-specific exposure time, frequency, and duration to the air concentration. Thus, HQ is calculated as follows:

$$[(CA \times ET \times EF \times ED) / AT] \div RfC = HQ$$

Each calculation with a specific combination of constituent, receptor, and exposure pathway, will have a distinct calculated HQ. HQs associated with all constituents for a particular pathway are summed to yield the HI, as indicated:

$$HQ_i + HQ_{ii} + HQ_{iii} + ... = HI$$

If a receptor is subject to exposure through more than one pathway, the HIs for all pathways are summed. A calculated HI of 1 or less indicates that an adverse effect would not be anticipated. HIs are most appropriately derived for constituents that act on the same target organ or have similar critical effect. Therefore, if the total HI across all COI exceeds 1, it is appropriate to segregate the COI by effect and mechanism of action and to derive separate HIs for each group (USEPA, 1989).

4.2 EVALUATION OF POTENTIAL CARCINOGENIC RESPONSES

The subsections below discuss the assumed mechanisms of carcinogenic response, the derivation of carcinogenic toxicity values, the manner in which these values are used in this risk assessment, and some of the limitations of these values. The limitations are addressed in greater detail in the Uncertainty Analysis of this report (Section 6).

4.2.1 Background

USEPA typically has required that potentially carcinogenic constituents be treated as if minimum threshold doses do not exist (USEPA, 2005a). The regulatory dose-response curve used for carcinogens only allows for zero risk at zero dose. Thus, for all environmental doses, some level of risk is assumed to be present.

To estimate the theoretical response at environmental doses, various mathematical dose-response models are used. USEPA uses the linearized multistage model for low dose extrapolation. This model assumes that the effect of the carcinogenic agent on tumor formation seen at high doses in animal data is basically the same at low doses (i.e., the slope of the dose-response curve can be extrapolated downward to the origin in a linear manner). USEPA's Guidelines for Carcinogen Risk Assessment (USEPA, 2005a) recommend that the linearized multistage model be employed in the absence of adequate information to the contrary.

4.2.2 Potential Carcinogenic Toxicity Values

USEPA evaluates all available scientific information, using a weight-of-evidence approach to determine whether a constituent poses a carcinogenic hazard in humans. USEPA groups constituents according to their potential for carcinogenic effects based on clinical evidence (USEPA, 1989):

- Group A - Human Carcinogen
- Group B - Probable Human Carcinogen
- Group C - Possible Human Carcinogen
- Group D - Insufficient Data to Classify as a Human Carcinogen
- Group E - Not a Human Carcinogen

In addition, constituents may have been assessed for carcinogenicity using USEPA's (2005a) Guidelines for Carcinogen Risk Assessment. Under the updated guidance, standard descriptors are used as part of the hazard narrative to express the conclusion regarding the weight-of-evidence for carcinogenic hazard potential. There are five recommended standard hazard descriptors: "Carcinogenic to Humans," "Likely to Be Carcinogenic to Humans," "Suggestive Evidence of Carcinogenic Potential," "Inadequate Information to Assess Carcinogenic Potential," and "Not Likely to Be Carcinogenic to Humans."

Cancer slope factors (CSFs) and inhalation unit risks (IURs) are the toxicity values used in quantitatively assessing potential carcinogenic effects from exposure. CSFs are defined as the plausible upper bound, approximating a 95% confidence limit, of the increased cancer risk from a lifetime exposure to a given level of a carcinogen. This estimate, usually expressed in units of proportion (of a population) affected per mg/kg-day, is generally reserved for use in the low dose region of the dose-response relationship, that is, for exposure corresponding to risks less than 1 in 100 (USEPA, 2005a).

The CSF (used to evaluate the oral route of exposure) is expressed in units of reciprocal dose $(mg/kg\text{-}day)^{-1}$, while the IUR (used to evaluate the inhalation exposure route) is expressed as a reciprocal concentration $(mg/m^3)^{-1}$. CSFs for the dermal route of exposure are developed through route-to-route extrapolation, as described by USEPA (2004b). An oral CSF is converted to an absorbed dose by dividing the CSF by the fractional absorption value. The absorption efficiency factors recommended by USEPA (2004b; 2013a) were identified in Section 4.1.2 above.

4.2.3 Estimating the Mutagenic Mode of Action for Potential Carcinogens

The Guidelines for Carcinogen Risk Assessment (USEPA, 2005a) and Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005b) address a number of issues pertaining to cancer risks associated with early-life exposures. Specifically, USEPA (2005b) provides guidance on potency adjustment for carcinogens acting through a mutagenic mode of action. This guidance recommends for such substances, a default approach using estimates from chronic studies with appropriate modifications to address the potential for differential risk of early-lifestage exposure. Default adjustment factors are recommended for use in the absence of constituent-specific data to assess cancer susceptibility from early-life exposure to a carcinogen acting through a mutagenic mode of action.

Benzo(a)pyrene was identified as a COI in onsite soil and sediment from the East Fork of Chisholm Creek. This constituent has been identified as a potential carcinogen with a mutagenic mode of action. For benzo(a)pyrene, age-dependent adjustment factors (ADAFs) are applied to the cancer slope factors for early-life age groups, as follows:

- A factor of 3 is applied to the CSF for the recreational youth to evaluate exposures from age 7 through 16.
- No adjustment is made to evaluate exposures for worker receptors and the recreational adult, whose exposure occurs within the adult age range.

4.2.4 Estimating the Theoretical Excess Lifetime Cancer Risk

For potentially carcinogenic constituents, a risk assessment evaluates the degree to which a receptor may have an increased likelihood of developing cancer over a lifetime due to exposure to site-associated constituents. At environmental dosage levels, the CSF is assumed to be constant and potential carcinogenic risk to be directly related to intake. In order to estimate the theoretical excess lifetime cancer risk, the lifetime average daily dose (LADD) of a constituent is multiplied by the CSF as shown.

$$LADD \times CSF = Risk$$

The equations for calculating the LADD were presented in Tables 3-25 and 3-26.

Similarly, for the inhalation exposure route, the potential cancer risk is calculated by multiplying the exposure concentration by the IUR. The equation for calculating the EC for inhalation of volatiles and particulates was presented in Table 3-27. Thus, the potential cancer risk is calculated as follows:

$$[(CA \times ET \times EF \times ED) / AT] \times IUR = Risk$$

For each pathway, these calculations are carried out for each applicable constituent, and the risks are summed to obtain the total risk due to that pathway. The total theoretical excess lifetime cancer risk for a particular receptor is then calculated as the sum of the risks from all exposure pathways for that receptor.

4.3 TOXICITY VALUES FOR CONSTITUENTS OF INTEREST

The toxicity values for COI are presented in Tables 4-1 and 4-2. The chronic and subchronic noncarcinogenic RfDs and RfCs are presented in Table 4-1. This table also lists the target organ or critical effect for each COI. The CSFs and IURs, along with the weight-of-evidence classification, are presented in Table 4-2. Absorption efficiency factors and dermal toxicity values [estimated from the oral

values in accordance with USEPA (2004b)] are also presented in these tables. In the absence of a specific subchronic value for a constituent, the chronic value was used.

Toxicity values were obtained from the following hierarchy of sources:

- Tier 1 – The USEPA's Integrated Risk Information System (IRIS; USEPA, 2014a)
- Tier 2 – The USEPA's Provisional Peer-Reviewed Toxicity Values (PPRTV; USEPA, 2014b)
- Tier 3 – Other sources, including but not limited to:
    - The California EPA's Toxicity Values as presented in the USEPA Regional Screening Level Tables (USEPA, 2013a); and
    - The Agency for Toxic Substances and Disease Registry's (ATSDR) Minimal Risk Levels (MRLs; ATSDR, 2014).

4.4 EVALUATION OF LEAD

Lead was identified as a COI in soil of the Central and Eastern Areas and in sediment of the East Fork of Chisholm Creek. Outdoor workers and construction workers are potentially exposed to lead in soil; and recreational receptors are potentially exposed to lead in sediment.

For adult and youth receptors, the methodology proposed by the Technical Review Workgroup (TRW; USEPA, 2003) was selected to assess lead exposure. The TRW adult lead model was designed to be protective of the fetus of pregnant women, but can be extended to address adult males or women who are not pregnant. The model uses a simplified representation of lead biokinetics to predict quasi-steady state blood lead concentrations among adults who have relatively steady patterns of site exposures. The model incorporates a simplified slope factor approach. The model assumes a baseline lead level using average blood lead levels for adults. Media-specific intake and absorption parameters are assessed for the adult population, and a biokinetic slope factor that relates uptake of lead into the body to blood lead levels is estimated.

The TRW adult lead model was developed to evaluate exposure via ingestion of soil. Thus, adult blood lead levels are calculated based on statistical information concerning baseline exposures to lead primarily from dietary lead and an assessment of potential exposure to lead in soil and dust.

The following subsections present the approach used in application of the TRW adult lead model to the outdoor worker, construction worker, and the recreational receptors potentially exposed to lead in soil and sediment.

4.4.1 Modeling Approach and Equation

The TRW Adult Lead Model predicts a central tendency blood lead concentration ($PbB_{adult,central}$) by summing the typical blood lead concentration ($PbB_{adult,0}$) that would occur in the absence of any recreational or occupational exposure to soils with the increment in blood lead that is expected as a result of site-specific exposure to soil and dust. The latter is estimated by multiplying the absorbed dose of lead from site-specific soil exposures by a biokinetic slope factor (BKSF). The basic equation is:

$$PbB_{adult,\,central} = PbB_{adult,0} + (PbS \times BKSF \times IR_S \times AF_S \times EF_S) / AT$$

where:

$PbB_{adult,central}$	=	Central estimate of the blood lead concentration (µg/dL) in an adult (i.e., woman of child-bearing age) that has site exposure to lead via occupational or recreational activities
$PbB_{adult,0}$	=	Typical (i.e., baseline) blood lead concentration (µg/dL) in an adult not exposed to lead via occupational or recreational activities.
PbS	=	Soil lead concentration (µg/g) (appropriate average concentration for the individual).
BKSF	=	Biokinetic slope factor relating (quasi-steady state) increase in typical adult blood lead concentration to average daily lead uptake (µg/dL increase in blood lead per µg/day lead absorbed).
IR_S	=	Mean daily intake rate of soil, including both outdoor soil and indoor soil-derived dust (g/day).
AF_S	=	Absolute gastrointestinal absorption fraction for ingested lead in soil and lead in dust derived from soil (dimensionless).
EF_S	=	Exposure frequency for contact with assessed soils and/or dust derived in part from these soils (days of exposure during the averaging period); may be taken as days per year for continuing, long term exposure.
AT	=	Averaging time; the total period during which soil contact may occur; 365 days per year for continuing long term exposures.

Although this model is appropriate for women of child bearing age, it is also considered the most appropriate model for older youth receptors, as the alternative model applies only to young children ages 6 and under.

The USEPA has not yet issued formal guidance on the blood lead level that is considered appropriate for the health of adults and older children. However, both the USEPA and CDC recommend that there should be no more than a 5% likelihood that a young child should have a PbB value greater than 10 ug/dL (CDC, 1991; USEPA; 1991b).

The USEPA (2003) recommends that in the industrial setting the pregnant woman industrial worker is the most sensitive receptor and that this receptor should be the subject of the risk assessment. The greater sensitivity is associated with exposure of the fetus to maternal blood lead, rather than the dose to the pregnant woman, herself. Since the exposed populations of workers could include pregnant women, this risk assessment accommodates that recommendation and incorporates the pregnant woman receptor for the construction worker scenario. The health criterion selected for use in this risk assessment is that there should be no calculated event that indicates that the fetus of a pregnant woman in the industrial setting would have a blood lead concentration above 10 ug/dL. This same assumption is extrapolated to the recreational adult and youth scenarios as well.

The concentration of lead in the blood of an unborn fetus (PbB_{fetal}) can be derived from the blood lead concentration in the mother by applying a transfer factor (Rfetal/maternal) that relates the two blood concentrations:

$$PbB_{fetal} = PbB_{adult} \times R_{fetal/maternal}$$

USEPA (2003) specifies a value of 0.9 for $R_{fetal/maternal}$ to represent the ratio of the blood lead concentration in the fetus to the blood lead concentration in the mother.

4.4.2 Equation Input Parameters

Presented below is a summary of available information on each parameter in this equation, along with the value selected for use in this risk assessment.

Baseline Blood Lead Level ($PbB_{adult,0}$): Of the various types of people who might be exposed to lead in a non-residential setting, the scientific community suggests that the receptor of greatest interest is, as noted above, a woman of child-bearing age. USEPA (2009b) provides a recommended mean PbB value of 1.0 ug/dL to represent women of child-bearing age (17 to 45 years). This value was derived from the updated National Health and Nutrition Examination Survey (NHANES) conducted between 1999 and 2004 (USEPA, 2009b).

Concentration of Lead in Soil (or Sediment) (PbS): The appropriate soil lead concentration for the model is the arithmetic mean concentration. For lead in surface soil from the Central Area, the mean concentration

is 52 mg/kg. For lead in surface and subsurface soil from the Central Area, the mean concentration is 46.9 mg/kg. These concentrations were presented previously in Tables 3-3 and 3-4. For lead in surface soil from the Eastern Area, the mean concentration is 130 mg/kg. For lead in surface and subsurface soil from the Eastern Area, the mean concentration is 193 mg/kg. These concentrations were presented previously in Tables 3-5 and 3-6. For lead in sediment of the East Fork of Chisholm Creek, the mean concentration is 323 mg/kg, as presented previously in Table 3-11.

Biokinetic Slope Factor (BKSF): The biokinetic slope factor proposed by the TRW (USEPA, 2003) is 0.4 µg/dL per µg/day absorbed. This value was derived from a study of adult humans exposed to lead in tap water (Pocock et al., 1983). The calculation was based on the relationship between the concentration of lead in "first-draw" water and the resulting incremental change in blood lead concentration. The "first-draw" parameter represents lead in the drinking water as a result of leaching of lead from pipes or pipe solder into the water as it resides in the pipe prior to flushing.

Ingestion Rate (IR_S): The parameter IRS is the site-specific daily intake rate of soil and soil-derived dust. The soil ingestion rate selected for the dose calculations in this assessment is 0.10 g/day for the outdoor worker and recreational receptors. The ingestion rate for the construction worker is 0.33 g/day. These are the same ingestion rates identified in Section 3.5.2.

Absorption Fraction (AF_S): Multiple studies have been published on the absorption of lead. USEPA (2003) provides an absorption factor of 20% for soluble lead. In addition, a relative bioavailability factor of 60% was applied in the soil calculations. The resulting net absorption fraction recommended by USEPA is 12%.

Exposure Frequency (EF_S): Exposure frequency for the outdoor worker is 225 days per year (USEPA, 2002a). On the basis of professional judgment, exposure frequency for the construction worker is 90 days per year. The exposure frequency for the recreational receptors is 39 days/year. These are the same exposure frequencies identified in Section 3.5.1.1.

Averaging Time (AT): The averaging time recommended by USEPA (2003) for continuing long-term exposures is 365 days per year. This value was used for the outdoor worker, the construction worker and the recreational receptors.

4.4.3 Calculating the Upperbound Estimate

An upperbound estimate of the concentration of lead in blood can be estimated using the approach adopted by the TRW (USEPA, 2003). In this approach, the geometric mean of the blood lead concentration is

estimated, and the 95th percentile of the blood lead concentration ($PbB_{adult,0.95}$) is calculated with the following equation:

$$PbB_{adult,\ 0.95} = PbB_{adult,\ central} \times GSDi^{\ 1.645}$$

The GSDi is the estimated value of the geometric standard deviation of the blood lead concentrations of the study population and the exponent, 1.645, is the value of the standard normal derivative used to calculate the 95th percentile from a lognormal distribution of blood lead concentration. The GSDi value of 1.8 was used; this value is based on the updated NHANES study, and is recommended by USEPA (2009b).

As indicated in Section 4.4.1, the concentration of lead in the blood of an unborn fetus can be derived from the blood lead concentration in the mother by applying a transfer factor that relates the two blood concentrations. This equation is appropriate for the upperbound concentration as well as the central concentration. The calculated fetal blood lead concentrations are presented and discussed as part of the Risk Characterization (Section 5).

5.0 RISK CHARACTERIZATION

Risk characterization is the final step of the human health risk assessment process. It includes a description of the nature and magnitude of the potential for occurrence of adverse health effects under reasonable maximal exposure conditions. In this step, the toxicity assessment and site-specific exposure assessment are integrated into quantitative and qualitative estimates of potential health risks. Potential noncarcinogenic and carcinogenic health risks are calculated and summarized individually for each receptor exposed to COI at the site (lead was evaluated separately). Estimated risks are combined across constituents and exposure pathways as appropriate.

Potential noncarcinogenic effects associated with exposure to COI from the site were estimated as described in Section 4.1.3. The total HIs are then calculated for each receptor by combining pathway-specific HIs. An HI value equal to or less than 1 indicates that the likelihood of an adverse noncancer effect would be negligible (USEPA, 1989). An HI greater than 1 indicates that additional evaluation of the case is warranted.

Theoretical excess lifetime cancer risks associated with exposure to COI from the site were estimated as described in Section 4.2.3. Summed theoretical excess cancer risks are calculated for each receptor by combining pathway-specific risks. The results may be compared with target benchmarks for acceptable risk. Various demarcations of acceptable risk have been established by regulatory agencies. USEPA (1991a) considers potential cancer risks in the range of 1×10^{-6} to 1×10^{-4} to be acceptable.

Fetal blood lead concentrations associated with exposure to lead in soil of the Central and Eastern Areas and sediment of the East Fork of Chisholm Creek were calculated as described in Section 4.4. For comparative purposes, the fetal blood lead concentration of concern is 10 µg/dL.

A summary of the noncancer HIs, potential cancer risks, and fetal blood lead concentrations for all areas, receptors, and exposure pathways is presented in Table 5-1. These results are described in detail in the following subsections.

5.1 WESTERN AREA

The following results were calculated for receptors potentially exposed to COI in soil or indoor air (vapor intrusion from shallow groundwater) from the Western Area.

- For the outdoor worker potentially exposed to COI in soil, the total noncancer HI of 0.61 is below the benchmark of 1, and the potential cancer risk of 4.66×10^{-5} is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

- For the construction worker potentially exposed to COI in soil, the total noncancer HI of 0.57 is below the benchmark of 1, and the potential cancer risk of 1.60×10^{-6} is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

- For the indoor worker potentially exposed to COI in indoor air (vapor intrusion from shallow groundwater), the total noncancer HI of 0.01 is less than the benchmark of 1, and the potential cancer risk of 3.13×10^{-8} is below USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

Constituent-specific results for each receptor are presented in Tables 5-2 through 5-4, and the detailed calculations, including constituent- and pathway-specific results, are presented in Appendices D-1 through D-3. The results indicate that no further evaluation of the potential for exposure to COI in soil or indoor air (vapor intrusion from shallow groundwater) from the Western Area is warranted.

5.2 CENTRAL AREA

The following results were calculated for receptors potentially exposed to COI in soil or indoor air (vapor intrusion from shallow groundwater) from the Central Area.

- For the outdoor worker potentially exposed to COI in soil, the total noncancer HI of 0.26 is below the benchmark of 1, and the potential cancer risk of 7.24×10^{-6} is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}. The predicted fetal blood lead concentration of 2.73 ug/dL is less than the benchmark of 10 ug/dL.

- For the construction worker potentially exposed to COI in soil, the total noncancer HI of 0.66 is below the benchmark of 1, and the potential cancer risk of 3.75×10^{-7} is below USEPA's target risk range of 1×10^{-6} to 1×10^{-4}. The predicted fetal blood lead concentration of 2.50 ug/dL is less than the benchmark of 10 ug/dL.

- For the indoor worker potentially exposed to COI in indoor air (vapor intrusion from shallow groundwater), the total noncancer HI of 0.015 is less than the benchmark of 1, and the potential cancer risk of 9.76×10^{-8} is below USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

- For the indoor worker potentially exposed to COI in indoor air (measured concentrations in Building E), the total noncancer HI of 0.59 is less than the benchmark of 1. No COI with potentially carcinogenic endpoints were identified for the indoor worker exposed to volatiles in indoor air; therefore, a potential cancer risk was not calculated for this receptor.

Constituent-specific results for each receptor are presented in Tables 5-5 through 5-8, and the detailed calculations, including constituent- and pathway-specific results, are presented in Appendices D-4 through D-7. The results indicate that no further evaluation of the potential for exposure to COI in soil or indoor air (including vapor intrusion from shallow groundwater) from the Central Area is warranted. In addition, the predicted fetal blood lead concentrations for the outdoor worker and the construction worker (Tables 5-9 and 5-10) are less than the benchmark of 10 ug/dL, indicating that no further evaluation is warranted for potential exposure to lead in soil associated with the Central Area.

5.3 EASTERN AREA

The following results were calculated for receptors potentially exposed to COI in soil or indoor air (vapor intrusion from shallow groundwater) from the Eastern Area.

- For the outdoor worker potentially exposed to COI in soil, the total noncancer HI of 0.028 is below the benchmark of 1, and the potential cancer risk of 2.80×10^{-6} is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}. The predicted fetal blood lead concentration of 3.27 ug/dL is less than the benchmark of 10 ug/dL.

- For the construction worker potentially exposed to COI in soil, the total noncancer HI of 0.25 is below the benchmark of 1, and the potential cancer risk of 3.54×10^{-7} is below USEPA's target risk range of 1×10^{-6} to 1×10^{-4}. The predicted fetal blood lead concentration of 2.91 ug/dL is less than the benchmark of 10 ug/dL.

- For the indoor worker potentially exposed to COI in indoor air (vapor intrusion from shallow groundwater), the total noncancer HI of 0.022 is less than the benchmark of 1, and the potential cancer risk of 7.79×10^{-8} is below USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

Constituent-specific results for each receptor are presented in Tables 5-11 through 5-13, and the detailed calculations, including constituent- and pathway-specific results, are presented in Appendices D-8 through D-10. The results indicate that no further evaluation of the potential for exposure to COI in soil or indoor air (vapor intrusion from shallow groundwater) from the Eastern Area is warranted. In addition, the predicted fetal blood lead concentrations for the outdoor worker and the construction worker (Tables 5-14 and 5-15) are less than the benchmark of 10 ug/dL, indicating that no further evaluation is warranted for potential exposure to lead in soil associated with the Eastern Area.

5.4 EAST FORK OF CHISHOLM CREEK

The following results were calculated for receptors potentially exposed to COI in sediment of the East Fork of Chisholm Creek.

- For the recreational adult potentially exposed to COI in sediment, the total noncancer HI of 0.0028 is below the benchmark of 1, and the potential cancer risk of 5.91×10^{-7} is below USEPA's target risk range of 1×10^{-6} to 1×10^{-4}. The predicted fetal blood lead concentration of 2.76 ug/dL is less than the benchmark of 10 ug/dL.

- For the recreational youth potentially exposed to COI in sediment, the total noncancer HI of 0.0051 is below the benchmark of 1, and the potential cancer risk of 4.22×10^{-7} is below USEPA's target risk range of 1×10^{-6} to 1×10^{-4}. The predicted fetal blood lead concentration of 2.76 ug/dL is less than the benchmark of 10 ug/dL.

Constituent-specific results for each receptor are presented in Tables 5-16 and 5-17, and the detailed calculations, including constituent- and pathway-specific results, are presented in Appendices D-11 and D-12. The results indicate that no further evaluation of the potential for exposure to COI in sediment from the East Fork of Chisholm Creek is warranted. In addition, the predicted fetal blood lead concentrations for the recreational adult and youth (Tables 5-18 and 5-19) are less than the benchmark of 10 ug/dL, indicating that no further evaluation is warranted for potential exposure to lead in sediment associated with the East Fork of Chisholm Creek.

6.0 UNCERTAINTY ANALYSIS

Uncertainties are inherent in a quantitative risk assessment. The inclusion of site-specific factors, which this assessment has incorporated, decreases uncertainty. An analysis of the areas of uncertainty in a risk assessment is a standard component of the risk assessment process. The uncertainty analysis provides a context for better understanding the assessment conclusions by identifying the uncertainties that have most significantly affected the assessment results.

USEPA guidance (1992a) stresses the importance of providing a complete analysis of uncertainties so that risk management decisions take these uncertainties into account when evaluating risk assessment conclusions. The major sources of uncertainty in this risk assessment are identified qualitatively below.

6.1 UNCERTAINTIES IN HAZARD IDENTIFICATION

Uncertainties in the hazard identification step of the risk assessment are associated with the available analytical data and the selection process for identification of COI.

- **Sampling Approaches**. The environmental sampling conducted during the investigations at the Clean Harbors site was not random. Specific historical source areas, including SWMUs, AOCs and OAs, were targeted for sampling. Because the samples used in this assessment were collected in areas of the site where contamination was considered most likely to exist, the soil data sets are likely to be biased toward high concentrations. It should also be noted that a targeted sampling approach could result in hot spots being missed, in which case the data sets could be biased low.

- **Identification of COI**. Multiple uncertainties exist in the process of identifying COI. Constituents detected in site media were compared with screening values that are protective of human health. Of over one hundred constituents analyzed, less than half were detected and only a fraction of these were detected at concentrations that exceeded their screening values. The screening values used to identify COI were based on conservative assumptions (e.g., groundwater screening values assume the water is used as a drinking source, which is not the case for the site, and RSLs were based on the lower-end of acceptable targets, including a cancer risk of 1E-6 and an HQ of 0.1). This approach can result in the inclusion of a greater number of COI in the quantitative risk calculations.

  For site-related constituents that were "screened out" based on their detected concentrations, it was also important to examine the detection limits. Therefore, in this assessment, constituents that were identified as COI in one area of the site were retained as COI for other areas of the site if (1) their detection limits exceed screening benchmarks and (2) that constituent was detected at least once in that area. Constituents that were 100% non-detect in an area were not retained as COI because it

would not be appropriate to derive an EPC based on all non-detect data. However, it should be noted that these constituents could be present, and therefore, the possibility exists that risks presented in this report may be underestimated.

The approach outlined above resulted in the selection of vinyl chloride as a direct contact soil COI in the Central Area, and naphthalene and benzo(a)pyrene as direct contact soil COI in the Eastern Area. These constituents were detected in several samples from the Central and/or Eastern Areas, and had maximum detection limits that exceeded the RSL.

6.2 UNCERTAINTIES IN EXPOSURE ASSESSMENT

The USEPA approaches to exposure assessments generally require standard default exposure scenarios rather than site-specific evaluations of exposure. Under this approach, if a constituent is identified as a COI for a particular area and medium, it is assumed that exposure to that substance will occur at levels consistent with the default scenario. The default scenarios used in the human health risk assessment evaluate current and future potential exposure pathways under RME conditions. The RME scenario is defined as the highest exposure that is reasonably expected to occur at a site (USEPA, 1989).

- **Potentially Complete but De Minimis Exposure Pathways**. Indoor worker exposure to soil-derived dust was determined to be potentially complete, but de minimis. Evaluation of the outdoor worker scenario provides a much more conservative assessment of exposure to site soils than indoor worker exposure to soil-derived dust. In addition, there is uncertainty associated with estimation of dust concentrations in a building. It is therefore possible that the risks calculated in this assessment are underestimated for indoor workers based on the exclusion of this pathway.

- **Exposure by an Outdoor Worker:** The evaluation for the outdoor worker was conducted on the assumption that exposure occurred in one area only. It is possible that an outdoor worker could be exposed to contaminants from two or all three of the areas assessed, rather than just one; however, if this were the case, exposure in each area would be less than 8 hours a day for 225 days per year. Because the results for the outdoor worker in all three exposure areas were acceptable, exposure to a combination of areas would also result in acceptable levels of potential cancer risk and noncancer hazard.

- **Modeling of Air Concentrations**. Because concentrations of outdoor and indoor air were not measured in all areas of the site, fate and transport modeling was conducted to estimate these concentrations. Such models generally provide a conservative estimate of the actual air concentrations, especially since they assume a constant source concentration (as opposed to a continually degrading

source). Another conservative assumption included in the vapor intrusion modeling is the low air exchange rate used for the buildings (commercial buildings are highly ventilated, and higher air exchange rates would result in lower indoor air concentrations). Additional assumptions used in the model may over- or underestimate the predicted air concentrations. Table 8 of the Vapor Intrusion User's Guide (USEPA, 2004a) identifies several input factors and how increasing or decreasing the value affects the estimated indoor air concentrations (e.g., as the building volume increases, the air concentration decreases; as the soil vapor permeability increases, the air concentrations increase).

- **Use of Default Exposure Factors**. The use of default exposure factors, rather than site-specific exposure factors, leads to a degree of uncertainty in the predicted risks. The scientific literature contains examples of studies that indicate that actual environmental exposure factors are lower than the default values recommended by the USEPA (2002a, 2013a). As an example, the factors incorporated for incidental ingestion of soil (a primary exposure pathway for the site) for a worker receptor may be higher than are realized in practice. For outdoor and construction workers, this risk assessment used default values of 100 mg/day and 330 mg/day, respectively, as the amount of soil ingested each day. In actuality, this value is probably much less. However, the default exposure factors represent an RME scenario, as recommended for a baseline risk assessment. There are also cases in the exposure assessment where potential low bias is introduced; for example, the recreational receptors are assumed to visit the East Fork of Chisholm Creek once a week during the non-winter months. While more frequent visits to the creek are difficult to envision, it is possible that some receptor may visit the creek more frequently.

6.3 UNCERTAINTIES IN TOXICITY ASSESSMENT

- **Toxicity Assessment for Noncarcinogens**. Approaches typically utilized for designating RfDs are highly conservative. The USEPA (2014a) applies uncertainty factors (ranging from 3 to 10) to the NOAEL for a constituent in a toxicity study to account for factors such as animal-to-human extrapolation, interindividual variation in the human population, limitations in data quality or incomplete studies. Some of this uncertainty may be reduced if the absorption, distribution, metabolic fate, and excretion parameters of a constituent are known. Because the fate and mechanism of action of a constituent may differ in animals and humans, effects observed in animals may not be observed in humans, and vice versa. Interspecies dose conversion may also be limited by differences in lifespan, body size, breathing rates, or the route of administration utilized in a study.

- **Upper Bound CSFs and IURs.** The USEPA CSFs and IURs are considered to be plausible upper bounds of risk at a 95 percent confidence level. Thus there is a 95 percent probability that the

true risks do not exceed these levels, and the risks are likely to be much lower. The Carcinogen Assessment Group (USEPA, 2005a) states that the use of the linearized multistage model and upper bound risk estimates is appropriate, but that the lower limit of risk may be as low as zero. When biological factors are considered, the best estimate of the risk at very low levels is often zero.

- **Assessment of the Mutagenic Mode of Action.** USEPA (2005b) guidance suggests that potentially carcinogenic PAHs may act through a mutagenic mode of action, and therefore require a modified approach to address the potential for risk during early lifestage exposure. Therefore, this risk assessment has incorporated age-dependant adjustment factors for a youth receptor (ages 7 through 16). However, this approach is considered to be speculative, and the guidance emphasizes that the preferable approach is to estimate risk based on analyses of data rather than on default adjustment factors. "When data are available for a susceptible lifestage, they should be used directly to evaluate risks for that chemical and that lifestage on a case-by-case basis" (USEPA, 2005b). The use of default adjustment factors in this risk assessment has resulted in calculated potential risks for the youth that are 3 times greater than would be calculated using the standard, linear low-dose extrapolation approach.

- **Use of Chronic RfDs/RfCs to Evaluate Subchronic Exposures.** In the absence of an oral RfD or inhalation RfC derived specifically for subchronic exposure durations, the chronic value was used in this risk assessment. Use of the chronic RfD or RfC to evaluate subchronic exposure durations may overestimate the potential for adverse effects to construction workers, because in general, the subchronic values are higher. In other words, subchronic durations of exposure generally require greater constituent concentrations before the adverse effect is observed.

- **Assessment of Specific TPH Components as Opposed to TPH Fractions.** It is well recognized that TPH is a complex mixture of multiple substances, each with its own potential for toxicity. In the context of completing a risk assessment for such a complex mixture, one possible means is to guess at the potential for toxicity associated with the mixture. This is typically overly conservative because the exact components of the mixture are typically not known when this approach is taken. A more realistic risk assessment approach, and that used in this assessment, is to assess those constituents in the mixture considered to be the most toxicologically relevant. For TPH, the most relevant substances are BTEX and PAHs (including naphthalene). These were evaluated in this assessment.

6.4 UNCERTAINTIES IN RISK CHARACTERIZATION

The typical approach to risk assessment, and that used in this assessment, involves conservatively multiplying a combination of average and upper bound exposure assumptions together to evaluate exposure. USEPA risk assessment guidance (1989) specifies that numerous factors in the exposure equation should each be represented by the 95% UCL on the mean for that variable. These factors include the exposure point concentration, the contact rate with the environmental medium, and the exposure frequency and duration. While this approach may overestimate risk for exposure scenarios at the site, the approach is representative of an RME scenario, as recommended for a baseline risk assessment.

7.0 CONCLUSIONS

This human health risk assessment was conducted in a manner consistent with standard and customary USEPA approaches. Substances detected in soil, groundwater, soil gas, indoor air, sediment and surface water associated with the site were included and considered in this risk assessment. Constituents detected in each medium were compared with screening values that are protective of human health. Of over one hundred constituents analyzed, only a small number were detected at concentrations that exceeded their screening values.

Direct contact COI for soil of the Western Area consisted of: tetrachloroethene, trichloroethene and arsenic. Direct contact COI for soil of the Central Area consisted of: 1,2,4-trimethylbenzene, ethylbenzene, naphthalene, tetrachloroethene, total xylenes, trichloroethene, vinyl chloride, benzo(a)pyrene, MCPP, toxaphene, arsenic and lead, tetrachloroethene, trichloroethene and arsenic. Direct contact COI for soil of the Eastern Area consisted of: 1,2,4-trimethylbenzene, ethylbenzene, naphthalene, tetrachloroethene, total xylenes, trichloroethene, vinyl chloride, benzo(a)pyrene, arsenic and lead. COI were also identified for the soil migration to groundwater pathway for each of the three areas. These COI consisted of several VOCs, SVOCs, herbicides and pesticides and inorganics.

In groundwater, the COI for shallow and deep zone groundwater from the onsite and downgradient areas included: 1,1-dichloroethane, 1,2,4-trimethylbenzene, 1,2-dichloroethane, 1,3,5-trimethylbenzene, benzene, chloroform, cis-1,2-dichloroethene, ethylbenzene, isopropylbenzene, m&p-xylenes, methylene chloride, naphthalene, n-propylbenzene, o-xylene, tetrachloroethene, toluene, total xylenes, trichloroethene, vinyl chloride, 1-methylnaphthalene, mercury (total), lead (total), arsenic (total & dissolved), barium (total & dissolved), iron (total & dissolved), and manganese (total & dissolved). In addition, COI identified for upgradient groundwater from the shallow and deep zones included: benzene, carbon tetrachloride, chloroform, cis-1,2-dichloroethene, naphthalene, tetrachloroethene and trichloroethene. The COI identification process was conducted for upgradient groundwater in order to provide information on constituents that could be migrating onsite from upgradient sources within the NIC.

COI for vapor intrusion from onsite shallow groundwater consist of 1,1-dichloroethane, ethylbenzene, tetrachloroethene, trichloroethene and vinyl chloride. No COI for vapor intrusion were identified in data from soil gas samples collected from beneath the building foundation of Building E in the Central Area of the site. 1,2,4-trimethylbenzene was identified as a COI for indoor air (air concentrations were directly measured from two locations inside Building E). No constituents were detected in soil gas samples from Building E above the screening values, and therefore, no further evaluation of constituents in soil gas is warranted. Finally, the COI identified for sediment from the East Fork of Chisholm Creek consist of:

benzo(a)pyrene, arsenic and lead. No COI were identified for surface water from the East Fork of Chisholm Creek.

The Clean Harbors site is an active industrial facility, and future use is expected to remain industrial. An ordinance is in place which prohibits installation of groundwater wells for personal use in the vicinity of the site. As stated previously, for purposes of the risk assessment, the site was divided into three discrete onsite exposure areas: the Western Area, Central Area, and Eastern Area. Current and future onsite outdoor workers, construction workers, and indoor workers were considered as potential human receptors in each of these three areas. The outdoor worker and construction worker were assessed for incidental ingestion of soil, dermal contact with soil, and inhalation of volatile emissions and airborne particulates associated with wind erosion. The indoor worker was assessed for potential indoor air inhalation exposures for volatiles that could enter a future building from shallow groundwater (vapor intrusion). In addition, a recreational adult and youth were evaluated for potential exposure to COI in sediment from the East Fork of Chisholm Creek via incidental ingestion and dermal contact.

It is assumed that groundwater use restrictions will be placed on the site to prevent lifetime drinking water ingestion. As noted above, currently, concentrations of several constituents in groundwater exceed drinking water standards, indicating that should a risk assessment for a hypothetical lifetime groundwater ingestion scenario be conducted, the results would indicate unacceptable potential risk for this hypothetical future exposure pathway.

The risk characterization was conducted for each potential receptor, exposure pathway, and constituent in each exposure area. Benchmarks selected for the assessment are those consistent with USEPA guidance, incorporating an acceptable range of 1×10^{-6} to 1×10^{-4} for potential cumulative cancer risks, a target noncancer HI of 1, and an upperbound fetal blood lead level of 10 micrograms per deciliter (µg/dL). A summary of the results for each area and receptor is provided below:

- **Western Area:** For the outdoor worker potentially exposed to COI in soil, the total noncancer HI is 0.61 and the potential cancer risk is 4.66×10^{-5}. For the construction worker potentially exposed to COI in soil, the total noncancer HI is 0.57 and the potential cancer risk is 1.60×10^{-6}. For the indoor worker potentially exposed to COI in indoor air (vapor intrusion from shallow groundwater), the total noncancer HI is 0.01 and the potential cancer risk is 3.13×10^{-8}.

- **Central Area**: For the outdoor worker potentially exposed to COI in soil, the total noncancer HI is 0.26, the potential cancer risk is 7.24×10^{-6} and the predicted fetal blood lead concentration is 2.73 ug/dL. For the construction worker potentially exposed to COI in soil, the total noncancer HI is 0.66, the potential cancer risk is 3.75×10^{-7} and the predicted fetal blood lead concentration is 2.50 ug/dL. For the indoor worker potentially exposed to COI in indoor air (vapor intrusion from shallow

groundwater) – modeled concentrations, the total noncancer HI is 0.015 and the potential cancer risk is 9.76 x 10^{-8}. For the indoor worker potentially exposed to COI in indoor air (measured concentrations from Building E), the total noncancer HI is 0.59. No COI with potentially carcinogenic endpoints were identified for the indoor worker exposed to volatiles in indoor air; therefore, a potential cancer risk was not calculated for this scenario.

- **Eastern Area:** For the outdoor worker potentially exposed to COI in soil, the total noncancer HI is 0.028, the potential cancer risk is 2.80 x 10^{-6} and the predicted fetal blood lead concentration is 3.27 ug/dL. For the construction worker potentially exposed to COI in soil, the total noncancer HI is 0.25, the potential cancer risk is 3.54 x 10^{-7} and. the predicted fetal blood lead concentration is 2.91 ug/dL. For the indoor worker potentially exposed to COI in indoor air (vapor intrusion from shallow groundwater), the total noncancer HI is 0.022 and the potential cancer risk is 7.79 x 10^{-8}.

- **East Fork of Chisholm Creek:** For the recreational adult potentially exposed to COI in sediment, the total noncancer HI is 0.0028, the potential cancer risk is 5.91 x 10^{-7} and the predicted fetal blood lead concentration is 2.76 ug/dL. For the recreational youth potentially exposed to COI in sediment, the total noncancer HI is 0.0051, the potential cancer risk is 4.22 x 10^{-7} and the predicted fetal blood lead concentration is 2.76 ug/dL.

Based on analyses presented in this report, considering current use and expected future use, theoretical excess lifetime cancer risks meet acceptable levels (within or below USEPA's target risk range of 1 x 10^{-6} to 1 x 10^{-4} for cumulative effects) for all receptors in all site areas. HIs for all receptors and exposure pathways are also below the benchmark value of 1. The evaluation of exposure to lead in soil indicates that estimated fetal blood lead concentrations are projected to be below the benchmark value of 10 µg/dL for the outdoor worker and the constructions worker in the Central and Eastern Areas and for the recreational receptors in the East Fork of Chisholm Creek.

8.0 REFERENCES

Agency for Toxic Substances and Disease Registry (ATSDR, 2014) Minimal Risk Levels (MRLs). Available at http://www.atsdr.cdc.gov/mrls/index.html.

Cameron-Cole, LLC (2001) RCRA Facility Investigation (RFI), Phase II Work Plan.

Cameron-Cole, LLC (2002) RCRA Facility Investigation (RFI), Phase III Work Plan.

Cameron-Cole, LLC (2005) RCRA Facility Investigation (RFI) Report – Clean Harbors Kansas LLC, Formerly Safety-Kleen (Wichita), Inc. KSD007246846. Originally submitted January 20, 2003, and revised on January 20, 2005.

Cameron-Cole, LLC (2014) Phase IV Investigation Report. Clean Harbors Kansas LLC, Formerly Safety-Kleen (Wichita), Inc. In Production.

Camp, Dresser, & McKee (CDM, 2002) North Industrial Corridor (NIC) Site Draft Remedial Investigation Report, City of Wichita, August 2002.

Centers for Disease Control (CDC; 1991) Preventing Lead Poisoning in Young Children. U.S. Department of Health and Human Services.

Environmental Decision Group, Inc. (1999) RCRA Facility Investigation (RFI), Phase I Work Plan.

Kansas Department of Health and Environment (KDHE; 2008) Kansas Water Quality Standards and Supporting Documents, June 23, 2008. http://www.kdheks.gov/water/download/kwqs_plus_supporting.pdf

Kansas Department of Health and Environment (KDHE; 2010) Risk Based Standards for Kansas, RSK Manual – 5th Version, October 2010. www.kdheks.gov/remedial/download/RSK_Manual_10.pdf

Klaassen, C.D. (2001) Casarett and Doull's Toxicology: The Basic Science of Poisons, 6th edition. McGraw Hill Companies, Inc.

PRC (1990) Draft Preliminary Assessment Report. September 24, 1990.

Pocock, S.J., Shaper, A.G., Walker, M., Wale, C.J., Clayton, B., Delves, T., Lacey, R.F., Packham, R.F., and Powell, P. (1983) Effects of tap water lead, water hardness, alcohol, and cigarettes on blood lead concentration. Jour. Epidemiol. Commun. Health 37: 1-7.

United States Environmental Protection Agency (USEPA; 1989) Risk Assessment Guidance for Superfund. Volume I, Part A. Human Health Evaluation Manual. EPA/540/1-89/002.

United States Environmental Protection Agency (USEPA, 1991a) Risk Assessment Guidance for Superfund. Volume I, Part B. Development of Risk-Based Remediation Goals. Office of Emergency and Remedial Response. OSWER Directive 9285.7-018.

United States Environmental Protection Agency (USEPA; 1991b) Memorandum on Soil Lead Clean-up Guidance. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response.

United States Environmental Protection Agency (USEPA, 1992a) Guidelines for Exposure Assessment. Notice. Fed. Register 57:22888-22936.

United States Environmental Protection Agency (USEPA; 1992b) Guidance for Data Usability in Risk Assessment (Part A). Office of Solid Waste and Emergency Response, Washington, D.C. Publication 9285.7-09A, April 1992.

United States Environmental Protection Agency (USEPA, 1992c) Supplemental Guidance to RAGS. Calculating the Concentration Term. Office of Solid Waste and Emergency Response, Washington, D.C. Publication 9285.7, May 1992.

United States Environmental Protection Agency (USEPA; 2002a) Supplemental Guidance for Calculating Soil Screening Levels for Superfund Sites. Office of Solid Waste and Emergency Response. OSWER 9355.4-24. December.

United States Environmental Protection Agency (USEPA; 2002b) Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. Office of Solid Waste and Emergency Response. Pub. No. 9285.6-10. December 2002.

United States Environmental Protection Agency (USEPA, 2003) Recommendation of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. January 2003.

United States Environmental Protection Agency (USEPA; 2004a) User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. February 22, 2004.

United States Environmental Protection Agency (USEPA; 2004b) Risk Assessment Guidance for Superfund. Volume I, Part E. Supplemental Guidance for Dermal Risk Assessment. Office of Emergency and Remedial Response. OSWER Directive 9285.7-02EP. September.

United States Environmental Protection Agency (USEPA, 2005a) Guidelines for Carcinogen Risk Assessment. EPA/630/P-03/--1F. March 2005.

United States Environmental Protection Agency (USEPA; 2005b) Supplemental guidance for assessing cancer susceptibility from early-life exposure to carcinogens. Risk Assessment Forum, Washington, DC.

United States Environmental Protection Agency (USEPA; 2009a) Risk Assessment Guidance for Superfund. Volume I, Part F. Supplemental Guidance for Inhalation Risk Assessment. EPA/540/R-070/002. January 2009.

United States Environmental Protection Agency (USEPA; 2009b) Update of the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters. OSWER 9200.2-82. June 2009.

United States Environmental Protection Agency (USEPA; 2011a) Exposure Factors Handbook 2011 Edition (Final). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-09/052F, 2011.

United States Environmental Protection Agency (USEPA; 2011b) ProUCL Version 4.1.01. Software package and guidance manual developed by Lockheed Martin Environmental Services, and distributed by USEPA, Office or Research and Development.

United States Environmental Protection Agency (USEPA; 2012) Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil. OSWER Directive 9200.1-113. December 2012. http://www.epa.gov/superfund/bioavailability/pdfs/Arsenic%20Bioavailability%20POLICY%20Memorandum%2012-20-12.pdf

United States Environmental Protection Agency (USEPA; 2013a) Regional Screening Levels for Chemical Contaminants at Superfund Sites. November 2013 Update.

United States Environmental Protection Agency (USEPA; 2013b) Vapor Intrusion Screening Level (VISL) Calculator Version 3.2. November 2013.

United States Environmental Protection Agency (USEPA; 2014a) Integrated Risk Information System (IRIS). On-line database: www.epa.gov/iris.

United States Environmental Protection Agency (USEPA; 2014b) Provisional Peer Reviewed Toxicity Values for Superfund (PPRTV) Available on-line at: http://hhpprtv.ornl.gov/

TABLE 2-1
SOIL SAMPLES INCLUDED IN THE RISK ASSESSMENT
Clean Harbors Kansas, LLC- Wichita, Kansas

Risk Assessment Area	Medium	Sample Numbers and Sample Dates					
Western Area	Surface Soil	S13-1-0.5	10/10/2013	S14-4-0.5	10/7/2013	S18-2-2	10/7/2013
		S13-1-2	10/10/2013	S14-4-2	10/7/2013	S18-24-2	1/9/2014
		S13-2-0.5	10/10/2013	S14-5-0.5	10/7/2013	S18-25-2	1/9/2014
		S13-2-2	10/10/2013	S14-5-2	10/7/2013	S18-3-2	10/4/2013
		S13-3-0.5	10/8/2013	S14-6-0.5	12/19/2013	S18-4-2	10/16/2013
		S13-3-2	10/8/2013	S14-7-0.5	12/19/2013	S18-5-0.5*	10/14/2013
		S13-4-0.5	10/10/2013	S14-8-0.5	12/19/2013	S18-5-0.5Dup*	10/14/2013
		S13-4-2	10/10/2013	S14-9-2	12/20/2013	S18-5-2	10/14/2013
		S14-1-0.5	10/8/2013	S17-1-2	10/7/2013	S18-6-2	10/7/2013
		S14-10-2	12/20/2013	S17-2-0.5	10/4/2013	S18-7-2	12/17/2013
		S14-11-2	12/20/2013	S17-2-2	10/4/2013	S18-8-2	12/17/2013
		S14-1-2	10/8/2013	S18-10-2	12/17/2013	S18-9-2	12/17/2013
		S14-12-2	12/20/2013	S18-1-2	10/7/2013	S24-1-2	10/10/2013
		S14-2-0.5	10/10/2013	S18-14-2	12/19/2013	S24-2-0.5	10/14/2013
		S14-2-2	10/10/2013	S18-15-2	12/18/2013	S24-2-2	10/14/2013
		S14-3-0.5	10/8/2013	S18-16-2	12/18/2013	S24-3-2	10/8/2013
		S14-3-2	10/8/2013	S18-17-2	12/18/2013	S24-4-2	10/10/2013
	Subsurface Soil	S14-10-15	12/20/2013	S14-12-5	12/20/2013	S14-7-5	12/19/2013
		S13-1-10	10/10/2013	S14-13-10	1/8/2014	S14-8-10	12/19/2013
		S13-1-15	10/10/2013	S14-13-15	1/8/2014	S14-8-15	12/19/2013
		S13-1-5	10/10/2013	S14-13-20	1/8/2014	S14-8-20	12/19/2013
		S13-1-INT	10/10/2013	S14-13-5	1/8/2014	S14-8-5	12/19/2013
		S13-2-10	10/10/2013	S14-1-5	10/8/2013	S14-9-10	12/20/2013
		S13-2-15	10/10/2013	S14-2-10*	10/10/2013	S14-9-15	12/20/2013
		S13-2-5	10/10/2013	S14-2-10Dup*	10/10/2013	S14-9-20	12/20/2013
		S13-2-INT	10/10/2013	S14-2-15	10/10/2013	S14-9-5	12/20/2013
		S13-3-10	10/8/2013	S14-2-5	10/10/2013	S17-1-10*	10/7/2013
		S13-3-15	10/8/2013	S14-2-INT	10/10/2013	S17-1-10Dup*	10/7/2013
		S13-3-5	10/8/2013	S14-3-5	10/8/2013	S17-1-15	10/7/2013
		S13-3-INT	10/8/2013	S14-4-10	10/7/2013	S17-1-5	10/7/2013
		S13-4-5	10/10/2013	S14-4-15	10/7/2013	S17-1-Clay	10/7/2013
		S14-10-10	12/20/2013	S14-4-5	10/7/2013	S17-1-INT	10/7/2013
		S14-10-20	12/20/2013	S14-4-INT	10/7/2013	S17-2-10	10/4/2013
		S14-10-5	12/20/2013	S14-5-5	10/7/2013	S17-2-15	10/4/2013
		S14-11-10	12/20/2013	S14-6-10	12/19/2013	S17-2-5*	10/4/2013
		S14-11-15	12/20/2013	S14-6-15	12/19/2013	S17-2-5Dup*	10/4/2013
		S14-11-20	12/20/2013	S14-6-20	12/19/2013	S17-2-INT	10/4/2013
		S14-11-5	12/20/2013	S14-6-5	12/19/2013	S18-10-5	12/17/2013
		S14-12-10	12/20/2013	S14-7-10	12/19/2013	S18-1-10	10/7/2013
		S14-12-15	12/20/2013	S14-7-15	12/19/2013	S18-11-15	12/19/2013
		S14-12-20	12/20/2013	S14-7-20	12/19/2013	S18-11-20	12/19/2013

TABLE 2-1
SOIL SAMPLES INCLUDED IN THE RISK ASSESSMENT
Clean Harbors Kansas, LLC- Wichita, Kansas

Risk Assessment Area	Medium	Sample Numbers and Sample Dates					
Western Area (continued)	Subsurface Soil (continued)	S18-11-5	12/19/2013	S18-22-15	1/9/2014	S18-5-15	10/14/2013
		S18-1-15*	10/7/2013	S18-22-20	1/9/2014	S18-5-5	10/14/2013
		S18-1-15Dup*	10/7/2013	S18-22-5	1/9/2014	S18-5D-Clay	10/16/2013
		S18-12-15	12/17/2013	S18-23-10	1/9/2014	S18-5D-INT	10/8/2013
		S18-12-20	12/19/2013	S18-23-15	1/9/2014	S18-6-10	10/7/2013
		S18-12-5	12/19/2013	S18-23-20	1/9/2014	S18-6-15-INT	10/7/2013
		S18-13-5	12/17/2013	S18-23-5	1/9/2014	S18-6-5	10/7/2013
		S18-14-5	12/19/2013	S18-24-5	1/9/2014	S18-7-5	12/17/2013
		S18-1-5*	10/7/2013	S18-2-5	10/7/2013	S18-8-5	12/17/2013
		S18-1-5Dup*	10/7/2013	S18-25-5	1/9/2014	S18-9-5	12/17/2013
		S18-18-15	12/18/2013	S18-26-10	1/9/2014	S24-1-10	10/10/2013
		S18-18-5	12/18/2013	S18-26-15	1/9/2014	S24-1-15	10/10/2013
		S18-19-10	12/20/2013	S18-26-20	1/9/2014	S24-1-5	10/10/2013
		S18-19-15	12/20/2013	S18-26-5	1/9/2014	S24-1-INT	10/10/2013
		S18-19-20	12/20/2013	S18-2-INT	10/7/2013	S24-2-10	10/14/2013
		S18-19-5	12/20/2013	S18-3-10	10/4/2013	S24-2-15	10/14/2013
		S18-1-INT	10/7/2013	S18-3-15	10/4/2013	S24-2-5*	10/14/2013
		S18-20-10	1/7/2014	S18-3-5*	10/4/2013	S24-2-5Dup*	10/14/2013
		S18-20-15	1/7/2014	S18-3-5Dup*	10/4/2013	S24-2-INT	10/14/2013
		S18-20-20	1/7/2014	S18-3-INT	10/4/2013	S24-3-10	10/8/2013
		S18-20-5	1/7/2014	S18-4-10	10/16/2013	S24-3-15-INT	10/8/2013
		S18-2-10	10/7/2013	S18-4-15	10/16/2013	S24-3-5	10/8/2013
		S18-21-10	1/9/2014	S18-4-25	10/16/2013	S24-4-10*	10/10/2013
		S18-21-15	1/9/2014	S18-4-5	10/8/2013	S24-4-10Dup*	10/10/2013
		S18-21-20	1/9/2014	S18-4-INT	10/16/2013	S24-4-15	10/10/2013
		S18-21-5	1/9/2014	S18-5-10*	10/14/2013	S24-4-5	10/10/2013
		S18-2-15	10/7/2013	S18-5-10Dup*	10/14/2013	S24-4-INT	10/10/2013
		S18-22-10	1/9/2014				
Central Area	Surface Soil	A8-1-0.5	10/1/2013	DC-10-2	10/9/2013	DC-16-0.5	10/16/2013
		A8-1-2	10/1/2013	DC-11-0.5	10/9/2013	DC-16-2	10/16/2013
		BC-1-0.5	10/17/2013	DC-11-2	10/9/2013	DC-17-0.5*	10/9/2013
		BC-1-2	10/17/2013	DC-1-2	10/16/2013	DC-17-0.5Dup*	10/9/2013
		BC-2-0.5	10/17/2013	DC-12-0.5	10/9/2013	DC-17-2*	10/17/2013
		BC-2-2	10/17/2013	DC-12-2	10/9/2013	DC-17-2Dup*	10/17/2013
		BC-3-0.5	10/17/2013	DC-13-0.5	10/16/2013	DC-18-0.5	10/9/2013
		BC-3-2	10/17/2013	DC-13-2	10/16/2013	DC-18-2	10/9/2013
		BC-4-0.5	10/17/2013	DC-14-0.5	10/9/2013	DC-19-0.5	10/9/2013
		BC-4-2	10/17/2013	DC-14-2	10/9/2013	DC-19-2	10/9/2013
		DC-1-0.5	10/16/2013	DC-15-0.5	10/9/2013	DC-2-0.5	10/10/2013
		DC-10-0.5	10/9/2013	DC-15-2	10/9/2013	DC-20-0.5	10/9/2013

TABLE 2-1
SOIL SAMPLES INCLUDED IN THE RISK ASSESSMENT
Clean Harbors Kansas, LLC- Wichita, Kansas

Risk Assessment Area	Medium	Sample Numbers and Sample Dates					
Central Area (continued)	Surface Soil (continued)	DC-20-2	10/9/2013	DC-5-0.5	10/16/2013	S11-2-2	10/3/2013
		DC-21-0.5	10/16/2013	DC-5-2	10/16/2013	S1-2-0.5	10/17/2013
		DC-21-2	10/16/2013	DC-6-0.5	10/16/2013	S1-2-2	10/17/2013
		DC-2-2	10/10/2013	DC-6-2	10/16/2013	S11-3-0.5	10/11/2013
		DC-22-0.5	10/16/2013	DC-7-0.5	10/16/2013	S11-3-2	10/11/2013
		DC-22-2	10/16/2013	DC-7-2	10/16/2013	S11-4-2	12/18/2013
		DC-23-0.5	10/16/2013	DC-8-0.5	10/9/2013	S11-5-2	12/18/2013
		DC-23-2	10/16/2013	DC-8-2	10/9/2013	S11-6-2	12/18/2013
		DC-24-0.5	10/16/2013	DC-9-0.5	10/9/2013	S2-1-0.5	10/18/2013
		DC-24-2	10/16/2013	DC-9-2	10/9/2013	S2-1-2	10/18/2013
		DC-25-0.5	10/16/2013	DC-SUMP-0.5*	10/17/2013	S2-2-0.5	10/18/2013
		DC-25-2	10/16/2013	DC-SUMP-0.5Dup*	10/17/2013	S20-1-2	10/7/2013
		DC-26-0.5	10/16/2013	DC-SUMP-2*	10/17/2013	S2-2-2	10/18/2013
		DC-26-2	10/16/2013	DC-SUMP-2Dup*	10/17/2013	S3-1-0.5	10/18/2013
		DC-27-0.5	10/16/2013	S1-1-0.5	10/8/2013	S3-1-2	10/18/2013
		DC-27-2	10/16/2013	S10-1-0.5	10/7/2013	S3-2-0.5	10/18/2013
		DC-28-0.5	10/16/2013	S10-1-2	10/7/2013	S3-2-2	10/18/2013
		DC-28-2	10/16/2013	S11-1-0.5	10/8/2013	S4-1-0.5	10/15/2013
		DC-3-0.5	10/16/2013	S1-1-2	10/8/2013	S4-1-2	10/15/2013
		DC-3-2	10/16/2013	S11-1-2	10/3/2013	S4-2-0.5	10/15/2013
		DC-4-0.5	10/10/2013	S11-2-0.5	10/3/2013	S4-2-2	10/15/2013
		DC-4-2	10/10/2013				
	Subsurface Soil	A8-1-10	10/1/2013	DC-2-5	10/10/2013	DC-33-5	1/8/2014
		A8-1-15	10/1/2013	DC-25-5	10/16/2013	DC-4-5	10/10/2013
		A8-1-5	10/1/2013	DC-26-5	10/16/2013	DC-5-5	10/16/2013
		A8-1-INT	10/1/2013	DC-27-5	10/16/2013	DC-6-5	10/16/2013
		BC-5-10	12/18/2013	DC-28-5	10/16/2013	DC-7-5	10/16/2013
		BC-5-15	12/18/2013	DC-29-10	12/19/2013	DC-8-5	10/9/2013
		BC-5-20	12/18/2013	DC-29-15	12/19/2013	DC-9-5	10/9/2013
		BC-5-5	12/18/2013	DC-29-20	12/19/2013	DC-SUMP-10	10/17/2013
		DC-13-5	10/16/2013	DC-30-10	12/19/2013	DC-SUMP-15	10/17/2013
		DC-16-5	10/16/2013	DC-30-15	12/19/2013	DC-SUMP-5*	10/17/2013
		DC-17-10	10/17/2013	DC-30-20	12/19/2013	DC-SUMP-5Dup*	10/17/2013
		DC-17-15	10/17/2013	DC-31-10	12/19/2013	DC-Sump-7	10/17/2013
		DC-17-5*	10/9/2013	DC-31-15	12/19/2013	DC-SUMP-INT	10/17/2013
		DC-17-5Dup*	10/9/2013	DC-31-20	12/19/2013	S1-1-10	10/8/2013
		DC-17-INT	10/17/2013	DC-32-10	12/19/2013	S10-1-10	10/7/2013
		DC-18-5	10/9/2013	DC-32-15	12/19/2013	S10-1-15	10/7/2013
		DC-19-5	10/9/2013	DC-32-20	12/19/2013	S10-1-5	10/7/2013
		DC-21-5	10/16/2013	DC-33-10	1/8/2014	S10-1-INT*	10/7/2013
		DC-23-5	10/16/2013	DC-33-15	1/8/2014	S10-1-INTDup*	10/7/2013
		DC-24-5	10/16/2013	DC-33-20	1/8/2014	S10-2-10	10/10/2013

TABLE 2-1
SOIL SAMPLES INCLUDED IN THE RISK ASSESSMENT
Clean Harbors Kansas, LLC- Wichita, Kansas

Risk Assessment Area	Medium	Sample Numbers and Sample Dates					
Central Area (continued)	Subsurface Soil (continued)	S10-2-15	10/10/2013	S11-18-5	1/8/2014	S11-28-10	1/9/2014
		S10-2-20	10/10/2013	S11-19-10	1/8/2014	S11-28-15	1/9/2014
		S10-2-5	10/10/2013	S11-19-15	1/8/2014	S1-1-5	10/8/2013
		S11-10-10	12/20/2013	S11-19-20	1/8/2014	S1-1-INT	10/8/2013
		S11-10-15	12/20/2013	S11-19-5	1/8/2014	S1-2-10	10/17/2013
		S11-10-20	12/20/2013	S11-1a-20	10/16/2013	S1-2-15	10/17/2013
		S11-10-5	12/20/2013	S11-1-INT	10/3/2013	S1-2-5	10/17/2013
		S11-1-10	10/3/2013	S11-20-10	1/7/2014	S1-2-INT	10/17/2013
		S11-11-10	12/20/2013	S11-20-15	1/7/2014	S11-28-20	1/9/2014
		S11-11-15	12/20/2013	S11-20-20	1/7/2014	S11-28-5	1/9/2014
		S11-11-20	12/20/2013	S11-20-5	1/7/2014	S11-2-INT	10/3/2013
		S1-1-15	10/8/2013	S11-2-10	10/3/2013	S11-3-10	10/11/2013
		S11-11-5	12/20/2013	S11-21-10	1/7/2014	S11-3-15	10/11/2013
		S11-1-15	10/3/2013	S11-21-15	1/7/2014	S11-3-5	10/11/2013
		S11-12-10	12/20/2013	S11-21-20	1/7/2014	S11-3-INT	10/11/2013
		S11-12-15	12/20/2013	S11-21-5	1/7/2014	S11-4-10	12/18/2013
		S11-12-20	12/20/2013	S11-2-15	10/3/2013	S11-4-15	12/18/2013
		S11-12-5	12/20/2013	S11-22-10	1/7/2014	S11-4-20	12/18/2013
		S11-13-10	1/7/2014	S11-22-15	1/7/2014	S11-4-5	12/18/2013
		S11-13-15	1/7/2014	S11-22-20	1/7/2014	S11-5-10	12/18/2013
		S11-13-20	1/7/2014	S11-22-5	1/7/2014	S11-5-15	12/18/2013
		S11-13-5	1/7/2014	S11-23-10	1/7/2014	S11-5-20	12/18/2013
		S11-14-10	1/7/2014	S11-23-15	1/7/2014	S11-5-5	12/18/2013
		S11-14-15	1/7/2014	S11-23-20	1/7/2014	S11-6-10	12/18/2013
		S11-14-20	1/7/2014	S11-23-5	1/7/2014	S11-6-15	12/18/2013
		S11-14-5	1/7/2014	S11-24-10	1/8/2014	S11-6-5	12/18/2013
		S11-1-5	10/3/2013	S11-24-15	1/8/2014	S11-7-10	12/20/2013
		S11-15-10	1/7/2014	S11-24-20	1/8/2014	S11-7-15	12/20/2013
		S11-15-15	1/7/2014	S11-24-5	1/8/2014	S11-7-20	12/20/2013
		S11-15-20	1/7/2014	S11-2-5	10/3/2013	S11-7-5	12/20/2013
		S11-15-5	1/7/2014	S11-25-10	1/8/2014	S11-8-10	12/20/2013
		S11-16-10	1/7/2014	S11-25-15	1/8/2014	S11-8-15	12/20/2013
		S11-16-15	1/7/2014	S11-25-20	1/8/2014	S11-8-20	12/20/2013
		S11-16-20	1/7/2014	S11-25-5	1/8/2014	S11-8-5	12/20/2013
		S11-16-5	1/7/2014	S11-26-10	1/9/2014	S11-9-10	12/20/2013
		S11-17-10	1/7/2014	S11-26-15	1/9/2014	S11-9-15	12/20/2013
		S11-17-15	1/7/2014	S11-26-20	1/9/2014	S11-9-20	12/20/2013
		S11-17-20	1/7/2014	S11-26-5	1/9/2014	S11-9-5	12/20/2013
		S11-17-5	1/7/2014	S11-27-10	1/9/2014	S2-1-10	10/18/2013
		S11-18-10	1/8/2014	S11-27-15	1/9/2014	S2-1-15	10/18/2013
		S11-18-15	1/8/2014	S11-27-20	1/9/2014	S2-1-5	10/18/2013
		S11-18-20	1/8/2014	S11-27-5	1/9/2014	S2-1-INT	10/18/2013

TABLE 2-1
SOIL SAMPLES INCLUDED IN THE RISK ASSESSMENT
Clean Harbors Kansas, LLC- Wichita, Kansas

Risk Assessment Area	Medium	Sample Numbers and Sample Dates					
Central Area (continued)	Subsurface Soil (continued)	S20-1-10	10/7/2013	S3-1-10	10/18/2013	S4-2-5	10/15/2013
		S20-1-15	10/7/2013	S3-1-15	10/18/2013	S4-2-INT	10/15/2013
		S20-1-5	10/7/2013	S3-1-5	10/18/2013	T2-1-Clay	10/10/2013
		S20-1-INT	10/7/2013	S3-1-INT	10/18/2013	T3-3-Clay	10/11/2013
		S20-2-10	12/17/2013	S3-2-5	10/18/2013	T4-3-Clay*	10/16/2013
		S20-2-15	12/17/2013	S4-1-10	10/15/2013	T4-3-ClayDup*	10/16/2013
		S20-2-20	12/17/2013	S4-1-15	10/15/2013	T5-2d-23	10/15/2013
		S20-3-10	12/17/2013	S4-1-5	10/15/2013	T5-2d-Lower	10/15/2013
		S20-3-15	12/17/2013	S4-1-INT	10/15/2013	T5-2-INT*	10/15/2013
		S20-3-20	12/17/2013	S4-2-10	10/15/2013	T5-2-INTDup*	10/15/2013
		S2-2-5	10/18/2013	S4-2-15	10/15/2013		
Eastern Area	Surface Soil	A10-1-0.5	10/2/2013	A12-4-0.5	10/9/2013	JC-6-2	10/18/2013
		A10-10-2	12/18/2013	A12-4-2	10/9/2013	JC-7-0.5	10/18/2013
		A10-11-2	12/18/2013	A12-5-0.5	10/9/2013	JC-7-2	10/18/2013
		A10-1-2	10/2/2013	A12-5-2	10/9/2013	JC-8-0.5	10/18/2013
		A10-14-2	12/19/2013	JC-1-0.5	10/18/2013	JC-8-2	10/18/2013
		A10-16-2	1/6/2014	JC-10-0.5	10/18/2013	JC-9-0.5	10/18/2013
		A10-17-2	1/6/2014	JC-10-2	10/18/2013	JC-9-2	10/18/2013
		A10-2-0.5	10/2/2013	JC-11-0.5	10/18/2013	NBJ-1-0.5	10/7/2013
		A10-2-2	10/2/2013	JC-11-2	10/18/2013	NBJ-1-2	10/7/2013
		A10-3-2	10/3/2013	JC-1-2	10/18/2013	S22-1-0.5	10/18/2013
		A10-4-0.5	10/1/2013	JC-12-0.5	10/18/2013	S22-1-2	10/9/2013
		A10-4-2	10/1/2013	JC-12-2	10/18/2013	S22-2-0.5	10/9/2013
		A10-5-0.5	10/3/2013	JC-13-0.5	10/18/2013	S22-2-2	10/9/2013
		A10-5-2	10/3/2013	JC-13-2	10/18/2013	S25-1-0.5	10/8/2013
		A10-6-2	12/18/2013	JC-14-0.5	10/18/2013	S25-1-2	10/8/2013
		A10-7-2	12/18/2013	JC-14-2	10/18/2013	S25-2-0.5	10/9/2013
		A10-9-2	12/18/2013	JC-2-0.5	10/18/2013	S25-2-2	10/9/2013
		A11-1-0.5	10/15/2013	JC-2-2	10/18/2013	SEBJ-1-0.5	10/3/2013
		A11-1-2	10/15/2013	JC-3-0.5	10/18/2013	SEBJ-1-2	10/3/2013
		A12-1-0.5	10/9/2013	JC-3-2	10/18/2013	SEBJ-2-0.5	10/3/2013
		A12-1-2	10/9/2013	JC-4-0.5	10/18/2013	SEBJ-2-2	10/3/2013
		A12-2-0.5	10/9/2013	JC-4-2	10/18/2013	SEBJ-3-0.5	10/14/2013
		A12-2-2	10/9/2013	JC-5-0.5	10/18/2013	SEBJ-3-2	10/14/2013
		A12-3-0.5	10/18/2013	JC-5-2	10/18/2013	T6-2-2	10/17/2013
		A12-3-2	10/9/2013	JC-6-0.5	10/18/2013		

TABLE 2-1
SOIL SAMPLES INCLUDED IN THE RISK ASSESSMENT
Clean Harbors Kansas, LLC- Wichita, Kansas

Risk Assessment Area	Medium	Sample Numbers and Sample Dates					
Eastern Area (continued)	Subsurface Soil	A10-10-10	12/19/2013	A10-7-10	12/18/2013	JC-11-15	10/18/2013
		A10-10-15	12/19/2013	A10-7-15	12/18/2013	JC-11-5	10/18/2013
		A10-10-5	12/18/2013	A10-7-20	10/2/2013	JC-1-15	10/18/2013
		A10-1-10	10/2/2013	A10-7-5	12/18/2013	JC-11-INT	10/18/2013
		A10-11-5	12/18/2013	A10-8-5	12/18/2013	JC-13-10	10/18/2013
		A10-1-15	10/2/2013	A10-9-10	12/19/2013	JC-13-15	10/18/2013
		A10-12-10	12/19/2013	A10-9-15	12/19/2013	JC-13-5	10/18/2013
		A10-12-15	12/19/2013	A10-9-5	12/18/2013	JC-13-INT	10/18/2013
		A10-12-5	12/19/2013	A11-1-10	10/15/2013	JC-1-5	10/18/2013
		A10-13-10	12/19/2013	A11-1-15	10/15/2013	JC-1-INT	10/18/2013
		A10-13-15	12/19/2013	A11-1-5	10/15/2013	JC-3-10*	10/18/2013
		A10-13-5	12/19/2013	A11-1-INT	10/2/2013	JC-3-10Dup*	10/18/2013
		A10-1-5	10/2/2013	A12-10-10	12/17/2013	JC-3-15	10/18/2013
		A10-15-10	1/6/2014	A12-10-15	12/17/2013	JC-3-5	10/18/2013
		A10-15-5	1/6/2014	A12-10-20	12/17/2013	JC-3-INT	10/18/2013
		A10-16-5	1/6/2014	A12-10-5	12/17/2013	JC-4-5	10/18/2013
		A10-17-10	1/6/2014	A12-1-10	10/9/2013	JC-5-10	10/18/2013
		A10-17-15	1/6/2014	A12-1-15	10/9/2013	JC-5-15	10/18/2013
		A10-17-5	1/6/2014	A12-1-5*	10/9/2013	JC-5-5	10/18/2013
		A10-1-INT	10/2/2013	A12-1-5Dup*	10/9/2013	JC-5-INT	10/18/2013
		A10-2-10	10/2/2013	A12-1-INT	10/9/2013	JC-7-10*	10/18/2013
		A10-2-15	10/2/2013	A12-3-10	10/9/2013	JC-7-10Dup*	10/18/2013
		A10-2-17	10/2/2013	A12-3-15	10/9/2013	JC-7-15	10/18/2013
		A10-2-5	10/2/2013	A12-3-19	10/9/2013	JC-7-5	10/18/2013
		A10-2-INT	10/2/2013	A12-3-5	10/9/2013	JC-7-INT	10/18/2013
		A10-3-10	10/3/2013	A12-4-5	10/9/2013	JC-9-10*	10/18/2013
		A10-3-15	10/3/2013	A12-5-5	10/9/2013	JC-9-10Dup*	10/18/2013
		A10-3-5	10/3/2013	A12-7-10	12/17/2013	JC-9-15	10/18/2013
		A10-3-INT	10/3/2013	A12-7-15	12/17/2013	JC-9-5	10/18/2013
		A10-4-10	10/1/2013	A12-7-20	12/17/2013	JC-9-INT	10/18/2013
		A10-4-15	10/1/2013	A12-7-5	12/17/2013	NBJ-1-10	10/7/2013
		A10-4-5	10/1/2013	A12-8-10	12/17/2013	NBJ-1-15*	10/7/2013
		A10-4-Clay	10/1/2013	A12-8-15	12/17/2013	NBJ-1-15Dup*	10/7/2013
		A10-4-INT	10/1/2013	A12-8-20	12/17/2013	NBJ-1-5	10/7/2013
		A10-5-10	10/3/2013	A12-8-5	12/17/2013	NBJ-1-INT	10/7/2013
		A10-5-15	10/3/2013	A12-9-10	12/17/2013	S22-1-10	10/9/2013
		A10-5-5	10/3/2013	A12-9-15	12/17/2013	S22-1-15	10/9/2013
		A10-5-INT	10/3/2013	A12-9-20	12/17/2013	S22-1-5*	10/9/2013
		A10-6-10	12/18/2013	A12-9-5	12/17/2013	S22-1-5Dup*	10/9/2013
		A10-6-15	12/18/2013	JC-1-10	10/18/2013	S22-1-INT	10/9/2013
		A10-6-20	12/18/2013	JC-11-10*	10/18/2013	S22-2-10	10/9/2013
		A10-6-5	12/18/2013	JC-11-10Dup*	10/18/2013	S22-2-15	10/9/2013

TABLE 2-1
SOIL SAMPLES INCLUDED IN THE RISK ASSESSMENT
Clean Harbors Kansas, LLC- Wichita, Kansas

Risk Assessment Area	Medium	Sample Numbers and Sample Dates					
Eastern Area (continued)	Subsurface Soil (continued)	S22-2-5*	10/9/2013	SEBJ-13-15	1/8/2014	SEBJ-5-20	12/19/2013
		S22-2-5Dup*	10/9/2013	SEBJ-13-15	1/8/2014	SEBJ-6-10	12/19/2013
		S22-2-INT	10/9/2013	SEBJ-13-20	1/8/2014	SEBJ-6-15	12/19/2013
		S25-1-5	10/8/2013	SEBJ-13-5	1/8/2014	SEBJ-6-20	12/19/2013
		S25-2-15	10/14/2013	SEBJ-14-10	1/9/2014	SEBJ-7-10	12/18/2013
		S25-2-5	10/14/2013	SEBJ-14-15	1/9/2014	SEBJ-7-15	12/18/2013
		S25-3-10	12/18/2013	SEBJ-14-20	1/9/2014	SEBJ-7-20	12/18/2013
		S25-3-15	12/18/2013	SEBJ-14-5	1/9/2014	SEBJ-8-10	1/6/2014
		S25-3-20	12/18/2013	SEBJ-1-5	10/3/2013	SEBJ-8-15	1/6/2014
		S25-3-5	12/18/2013	SEBJ-1-INT	10/3/2013	SEBJ-8-20	1/6/2014
		SEBJ-10-10	1/6/2014	SEBJ-2-10	10/4/2013	SEBJ-8-5	1/6/2014
		SEBJ-10-15	1/6/2014	SEBJ-2-15*	10/4/2013	SEBJ-9-10	1/6/2014
		SEBJ-10-20	1/6/2014	SEBJ-2-15Dup*	10/4/2013	SEBJ-9-15	1/6/2014
		SEBJ-10-5	1/6/2014	SEBJ-2-5	10/18/2013	SEBJ-9-20	1/6/2014
		SEBJ-1-10	10/3/2013	SEBJ-2-INT	10/4/2013	SEBJ-9-5	1/6/2014
		SEBJ-11-10	1/6/2014	SEBJ-3-10	10/14/2013	T5-4-20	10/11/2013
		SEBJ-11-15	1/6/2014	SEBJ-3-15	10/18/2013	T5-4-Clay	10/11/2013
		SEBJ-11-20	1/6/2014	SEBJ-3-5	10/14/2013	T6-2-10	10/17/2013
		SEBJ-11-5	1/6/2014	SEBJ-3-INT	10/18/2013	T6-2-15	10/17/2013
		SEBJ-1-15	10/3/2013	SEBJ-4-10	12/19/2013	T6-2-20	10/17/2013
		SEBJ-12-10	1/8/2014	SEBJ-4-15	12/19/2013	T6-2-5	10/17/2013
		SEBJ-12-15	1/8/2014	SEBJ-4-20	12/19/2013	T6-2-Clay	10/17/2013
		SEBJ-12-20	1/8/2014	SEBJ-5-10	12/19/2013	T6-2-INT	10/17/2013
		SEBJ-12-5	1/8/2014	SEBJ-5-15	12/19/2013	T7-2-6	10/1/2013
		SEBJ-13-10	1/8/2014				

Note:
* Denotes samples of a duplicate pair.

TABLE 2-2
GROUNDWATER SAMPLES INCLUDED IN THE RISK ASSESSMENT
Clean Harbors Kansas, LLC - Wichita, Kansas

Area	Aquifer Zone	Sample Location	Sample Number	Sample Date	Sample Location	Sample Number	Sample Date
Western Area	Shallow	S13-1 (10/10/2013)*	10/10/2013	S18-1 (10/7/13)*	10/7/2013	SK-12S (4/19/2012)	4/19/2012
		S13-1 DUP (10/10/2013)*	10/10/2013	S18-1 (10/7/13) DUP*	10/7/2013	SK-12S (11/1/2012)	11/1/2012
		S13-2 (10/10/2013)*	10/10/2013	S18-2 (10/7/13)*	10/7/2013	SK-12S (4/18/2013)	4/18/2013
		S13-2 DUP (10/10/2013)*	10/10/2013	S18-2 (10/7/13) DUP*	10/7/2013	SK-12S (10/20/2013)	10/20/2013
		S13-3 (10/8/13)	10/8/2013	S18-3 (10/4/2013)	10/4/2013	SK-4S (4/19/2012)	4/19/2012
		S13-3 (10/17/13)	10/17/2013	S18-4 (10/8/13)*	10/8/2013	SK-4S (11/1/2012)	11/1/2012
		S14-2 (10/10/2013)	10/10/2013	S18-4 (10/8/13) DUP*	10/8/2013	SK-4S (4/18/2013)	4/18/2013
		S14-4 (10/7/13)	10/7/2013	S18-5 (10/8/2013)	10/8/2013	SK-4S (10/20/2013)	10/20/2013
		S14-4 (10/17/13)	10/17/2013	S24-1 (10/10/2013)	10/10/2013	SK-B92 (4/19/2012)	4/19/2012
		S17-1 (10/7/13)*	10/7/2013	S24-2 (10/8/2013)	10/8/2013	SK-B92 (10/31/2012)	10/31/2012
		S17-1 (10/7/13) DUP*	10/7/2013	S24-3 (10/8/2013)	10/8/2013	SK-B92 (4/18/2013)	4/18/2013
		S17-1a (10/7/2013)	10/7/2013	S24-4 (10/10/2013)	10/10/2013	SK-B92 (10/20/2013)	10/20/2013
		S17-2 (10/4/13)*	10/4/2013	TO-1 (10/11/13)	10/11/2013		
		S17-2 (10/4/13) DUP*	10/4/2013	T3-1 (10/3/2013)	10/3/2013		
	Deep	SK-12D (4/19/2012)	4/19/2012	SK-12D (10/20/2013)	10/20/2013	SK-4D (4/18/2013)	4/18/2013
		SK-12D (11/1/2012)	11/1/2012	SK-4D (4/19/2012)	4/19/2012	SK-4D (10/20/2013)	10/20/2013
		SK-12D (4/18/2013)	4/18/2013	SK-4D (11/1/2012)	11/1/2012		
	Fully Penetrating	HRI-03 (4/9/2012)	4/9/2012	HRI-03 (4/17/2013)	4/17/2013	HRI-03 (10/20/2013)	10/20/2013
		HRI-03 (11/1/2012)	11/1/2012				
Central Area	Shallow	A11-1 (10/15/2013)	10/15/2013	S10-1 (10/17/13)	10/17/2013	SK-2S (4/19/2012)Dup*	4/19/2012
		A8-1 (10/1/2013)	10/1/2013	S11-1 (10/4/13)	10/4/2013	SK-2S (11/1/2012)*	11/1/2012
		BC-2 (10/17/2013)	10/17/2013	S11-1a (10/16/2013)	10/16/2013	SK-2S (11/1/2012)Dup*	11/1/2012
		DC-17 (10/9/2013)*	10/9/2013	S11-2 (10/3/2013)	10/3/2013	SK-2S (4/18/2013)*	4/18/2013
		DC-17 DUP (10/9/2013)*	10/9/2013	S11-3 (10/3/2013)	10/3/2013	SK-2S (4/18/2013)Dup*	4/18/2013
		DC-3 (10/16/2013)	10/16/2013	S20-1 (10/7/2013)	10/7/2013	SK-2S (10/20/2013)*	10/20/2013
		DC-6 (10/16/2013)	10/16/2013	SK-2S (10/4/2013)	10/4/2013	SK-2S (10/20/2013)Dup*	10/20/2013
		DC-9 (10/9/2013)*	10/9/2013	T1-2 (10/11/2013)	10/11/2013	SK-3S (4/19/2012)	4/19/2012
		DC-9 DUP (10/9/2013)*	10/9/2013	T2-1 (10/10/2013)	10/10/2013	SK-3S (10/31/2012)	10/31/2012
		DC-SUMP (10/17/2013)	10/17/2013	T3-3 (10/11/2013)	10/11/2013	SK-3S (4/18/2013)	4/18/2013
		S1-1 (10/8/2013)*	10/8/2013	T3-2 (10/7/13)*	10/7/2013	SK-3S (10/20/2013)	10/20/2013
		S1-1 DUP (10/8/2013)*	10/8/2013	T3-2 (10/7/13) DUP*	10/7/2013	SK-5S (4/19/2012)	4/19/2012
		S1-2 (10/17/2013)	10/17/2013	T4-1 (10/2/2013)	10/2/2013	SK-5S (10/31/2012)	10/31/2012
		S2-1 (10/18/2013)	10/18/2013	T4-2 (10/3/2013)	10/3/2013	SK-5S (4/18/2013)	4/18/2013
		S3-1 (10/18/2013)	10/18/2013	T4-3 (10/4/2013)	10/4/2013	SK-5S (10/20/2013)	10/20/2013
		S4-1 (10/15/2013)	10/15/2013	T5-1 (10/2/2013)	10/2/2013	SK-B68 (4/19/2012)	4/19/2012
		S4-2 (10/15/2013)	10/15/2013	T5-3 (10/1/2013)	10/1/2013	SK-B68 (10/31/2012)	10/31/2012
		S10-1 (10/7/13)*	10/7/2013	T6-1 (10/1/2013)	10/1/2013	SK-B68 (4/18/2013)	4/18/2013
		S10-1 (10/7/13) DUP*	10/7/2013	SK-2S (4/19/2012)*	4/19/2012	SK-B68 (10/20/2013)	10/20/2013
	Deep	SK-2D (4/19/2012)	4/19/2012	SK-3D (4/19/2012)	4/19/2012	SK-5D (4/19/2012)	4/19/2012
		SK-2D (11/1/2012)	11/1/2012	SK-3D (10/31/2012)	10/31/2012	SK-5D (10/31/2012)	10/31/2012
		SK-2D (4/18/2013)	4/18/2013	SK-3D (4/18/2013)	4/18/2013	SK-5D (4/18/2013)	4/18/2013
		SK-2D (10/20/2013)	10/20/2013	SK-3D (10/20/2013)	10/20/2013	SK-5D (10/20/2013)	10/20/2013

TABLE 2-2
GROUNDWATER SAMPLES INCLUDED IN THE RISK ASSESSMENT
Clean Harbors Kansas, LLC - Wichita, Kansas

Area	Aquifer Zone	Sample Location	Sample Number	Sample Date	Sample Location	Sample Number	Sample Date
Eastern Area	Shallow	A10-3 (10/3/2013)	10/3/2013	JC-11 (10/18/2013)	10/18/2013	T6-2 (10/17/2013)	10/17/2013
		A10-4 (10/1/2013)	10/1/2013	JC-13 (10/18/2013)	10/18/2013	T7-1 (10/3/2013)	10/3/2013
		A10-5 (10/3/2013)	10/3/2013	NBJ-1 (10/7/2013)*	10/7/2013	T7-2 (10/1/2013)	10/1/2013
		A12-1 (10/9/2013)	10/9/2013	NBJ-1 DUP (10/7/2013)*	10/7/2013	JC-1 (12/20/13)	12/20/2013
		A12-1-Clay (10/17/2013)	10/17/2013	NBJ-1a (10/14/2013)	10/14/2013	SK-1S (4/18/2012)	4/18/2012
		A12-1-Lower (10/17/2013)	10/17/2013	S22-1 (10/9/2013)	10/9/2013	SK-1S (10/30/2012)	10/30/2012
		A12-3 (10/9/2013)	10/9/2013	S22-2 (10/9/2013)	10/9/2013	SK-1S (4/18/2013)	4/18/2013
		JC-1 (10/18/2013)	10/18/2013	SEBJ-1 (10/3/2013)	10/3/2013	SK-1S (10/19/2013)	10/19/2013
		JC-3 (10/18/2013)	10/18/2013	SEBJ-2 (10/4/13)*	10/4/2013	SK-6S (4/18/2012)	4/18/2012
		JC-5 (10/18/2013)	10/18/2013	SEBJ-2 (10/4/13) DUP*	10/4/2013	SK-6S (10/30/2012)	10/30/2012
		JC-5a (10/18/2013)	10/18/2013	SEBJ-3 (10/3/2013)	10/3/2013	SK-6S (4/18/2013)	4/18/2013
		JC-7 (10/18/2013)	10/18/2013	SK-1S (10/4/2013)	10/4/2013	SK-6S (10/19/2013)	10/19/2013
		JC-9 (10/18/2013)	10/18/2013	T5-4 (10/11/2013)	10/11/2013		
	Deep	SK-1D (4/18/2012)	4/18/2012	SK-1D (4/18/2013)	4/18/2013	SK-1D (10/19/2013)	10/19/2013
		SK-1D (10/30/2012)	10/30/2012				
	Fully Penetrating	RSC-1 (4/18/2012)	4/18/2012	RSC-1 (4/17/2013)	4/17/2013	RSC-1 (10/19/2013)Dup*	10/19/2013
		RSC-1 (10/30/2012)	10/30/2012	RSC-1 (10/19/2013)*	10/19/2013		
Upgradient	Shallow	MW-10 (4/18/2012)	4/18/2012	MW-14 (10/31/2012)	10/31/2012	MW-18 (10/19/2013)	10/19/2013
		MW-10 (10/31/2012)*	10/31/2012	MW-14 (4/17/2013)	4/17/2013	SK-8S (4/18/2012)	4/18/2012
		MW-10 (10/31/2012)Dup*	10/31/2012	MW-14 (10/19/2013)	10/19/2013	SK-8S (10/31/2012)	10/31/2012
		MW-10 (4/18/2013)	4/18/2013	MW-15 (4/18/2012)	4/18/2012	SK-8S (4/17/2013)	4/17/2013
		MW-10 (10/19/2013)	10/19/2013	MW-15 (10/31/2012)	10/31/2012	SK-8S (10/19/2013)	10/19/2013
		MW-11 (4/18/2012)	4/18/2012	MW-15 (4/17/2013)	4/17/2013	WND-32S (4/18/2012)	4/18/2012
		MW-11 (10/31/2012)	10/31/2012	MW-15 (10/19/2013)	10/19/2013	WND-32S (10/31/2012)	10/31/2012
		MW-11 (4/17/2013)	4/17/2013	MW-18 (4/18/2012)	4/18/2012	WND-32S (4/18/2013)	4/18/2013
		MW-11 (10/19/2013)	10/19/2013	MW-18 (10/31/2012)	10/31/2012	WND-32S (10/19/2013)	10/19/2013
		MW-14 (4/18/2012)	4/18/2012	MW-18 (4/17/2013)	4/17/2013		
	Deep	SK-7D (4/18/12)	4/18/2012	SK-8D (4/17/2013)	4/17/2013	WND-32DR (4/18/2012)	4/18/2012
		SK-7D (10/31/2012)	10/31/2012	SK-8D (10/19/2013)	10/19/2013	WND-32DR (10/31/2012)	10/31/2012
		SK-7D (4/17/2013)	4/17/2013	SK-9D (4/18/2012)	4/18/2012	WND-32DR (4/18/2013)	4/18/2013
		SK-7D (10/19/2013)	10/19/2013	SK-9D (10/31/2012)	10/31/2012	WND-32DR (10/19/2013)	10/19/2013
		SK-8D (4/18/2012)	4/18/2012	SK-9D (4/17/2013)	4/17/2013		
		SK-8D (10/31/2012)	10/31/2012	SK-9D (10/19/2013)	10/19/2013		
Downgradient	Shallow	T8-0 (10/4/13)*	10/4/2013	T8-4 (10/4/13)*	10/4/2013	SK-11S (4/18/2012)Dup*	4/18/2012
		T8-0 (10/4/13) DUP*	10/4/2013	T8-4 (10/4/13) DUP*	10/4/2013	SK-11S (10/30/2012)*	10/30/2012
		T8-1 (10/4/13)*	10/4/2013	T8-4 (10/4/13)	10/4/2013	SK-11S (10/30/2012)Dup*	10/30/2012
		T8-1 (10/4/13) DUP*	10/4/2013	T8-5 (10/4/13)*	10/4/2013	SK-11S (4/17/2013)*	4/17/2013
		T8-1D (10/14/13)	10/14/2013	T8-5 (10/4/13) DUP*	10/4/2013	SK-11S (4/17/2013)Dup*	4/17/2013
		T8-2 (10/4/13)*	10/4/2013	SK-10S (4/18/2012)	4/18/2012	SK-11S (10/19/2013)	10/19/2013
		T8-2 (10/4/13) DUP*	10/4/2013	SK-10S (10/30/2012)	10/30/2012	SK-13S (4/18/2012)	4/18/2012
		T8-2D (10/14/13)	10/14/2013	SK-10S (4/17/2013)	4/17/2013	SK-13S (10/30/2012)	10/30/2012
		T8-3 (10/4/13)*	10/4/2013	SK-10S (10/19/2013)	10/19/2013	SK-13S (4/17/2013)	4/17/2013
		T8-3 (10/4/13) DUP*	10/4/2013	SK-11S (4/18/2012)*	4/18/2012	SK-13S (10/19/2013)	10/19/2013

* Indicates samples from a duplicate pair.

TABLE 2-3
SOIL GAS AND INDOOR AIR SAMPLES INCLUDED IN THE RISK ASSESSMENT
Clean Harbors Kansas, LLC- Wichita, Kansas

Medium	Sample Identification	Sample Date
Indoor Air	AS1-DOWNSTAIRS	10/3/2013
	AS2-MAIN	10/3/2013
Subslab Soil Gas	AS-4	10/10/2013
	AS-5	10/10/2013

TABLE 2-4
SEDIMENT AND SURFACE WATER SAMPLES INCLUDED IN THE RISK ASSESSMENT
Clean Harbors Kansas, LLC- Wichita, Kansas

Medium	Sample Identification Numbers and Sample Dates			
Sediment	CC-1	10/4/2013	CC-7	10/11/2013
	CC-2	10/4/2013	CC-8	10/11/2013
	CC-3	10/4/2013	CC-9	10/11/2013
	CC-4	10/4/2013	CC-10	10/11/2013
	CC-5	10/8/2013	CC-11	10/11/2013
	CC-6	10/9/2013		
Surface Water	SW-BS-1	10/18/2013	SK-SW-1	10/18/2013
	SW-BS-2	10/18/2013	SK-SW-2	10/18/2013
	SW-BS-3	10/18/2013	SK-SW-3	10/18/2013
	SW-BS-4	10/18/2013	SK-SW-4	10/18/2013
	SW-BS-5	10/18/2013	SK-SW-5	10/18/2013

TABLE 2-5
CALCULATION OF THE SITE-SPECIFIC DILUTION ATTENUATION FACTOR
Clean Harbors Kansas, LLC - Wichita, Kansas

Equations:

$$DAF = 1 + \frac{K \times i \times d}{I \times L}$$

where:

$$d(m) = (0.0112\ L^2)^{0.5} + d_a\left(1 - \exp\left[\frac{-L * I}{K * i * d_a}\right]\right)$$

Parameter	Symbol	Value	Units	Source of Value
Dilution attenuation factor	DAF	24.1	unitless	Calculated
Aquifer hydraulic conductivity	K	15,019	m/yr	Based on pumping test conducted on the site in 1990 (CDM, 2002)
Hydraulic gradient	i	0.0025	m/m	Site-specific average for the upper zone; based on elevation data from October 2006
Mixing zone depth	d	4.0	m	Calculated
Infiltration rate	I	0.18	m/yr	USEPA (2002) default value used for mass-limit calculation
Source length parallel to groundwater flow	L	37	m	Site-specific source length based on soil data (120 ft)
Aquifer thickness	d_a	6	m	Site-specific; appx. sum of upper and lower zones (20 ft)

TABLE 2-6
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - WESTERN AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Volatile Organics									
1,1,1,2-Tetrachloroethane	0 / 110	ND	ND	ND	0.0025	0.26	9.3	No	Constituent not detected.
1,1,1-Trichloroethane	41 / 110	0.0008	0.277	S14-4-0.5	0.0025	0.0073	3800	No	Maximum detect below screening value.
1,1,2,2-Tetrachloroethane	0 / 110	ND	ND	ND	0.0025	0.26	2.8	No	Constituent not detected.
1,1,2-Trichloroethane	0 / 110	ND	ND	ND	0.0025	0.26	0.68	No	Constituent not detected.
1,1-Dichloroethane	12 / 110	0.0011	0.195	S14-4-0.5	0.0025	0.0078	17	No	Maximum detect below screening value.
1,1-Dichloroethene	4 / 110	0.0012	0.0037	S14-3-2	0.0025	0.26	110	No	Maximum detect below screening value.
1,1-Dichloropropene	0 / 110	ND	ND	ND	0.0025	0.26	NA	No	Constituent not detected.
1,2,3-Trichlorobenzene	0 / 110	ND	ND	ND	0.0025	0.26	49	No	Constituent not detected.
1,2,3-Trichloropropane	0 / 110	ND	ND	ND	0.0025	**0.26**	0.095	No	Constituent not detected.
1,2,4-Trichlorobenzene	0 / 110	ND	ND	ND	0.0025	0.26	27	No	Constituent not detected.
1,2,4-Trimethylbenzene	1 / 110	0.074	0.074	S24-3-2	0.0025	0.26	26	No	Maximum detect below screening value.
1,2-Dibromoethane	0 / 110	ND	ND	ND	0.0025	**0.26**	0.17	No	Constituent not detected.
1,2-Dichlorobenzene	0 / 110	ND	ND	ND	0.0025	0.26	980	No	Constituent not detected.
1,2-Dichloroethane	0 / 110	ND	ND	ND	0.0025	0.26	2.2	No	Constituent not detected.
1,2-Dichloroethene, Total	0 / 7	ND	ND	ND	0.0025	0.0055	920	No	Constituent not detected.
1,2-Dichloropropane	1 / 110	0.0013	0.0013	S13-4-0.5	0.0025	0.26	4.7	No	Maximum detect below screening value.
1,3,5-Trimethylbenzene	0 / 110	ND	ND	ND	0.0025	0.26	1000	No	Constituent not detected.
1,3-Dichlorobenzene	0 / 110	ND	ND	ND	0.0025	0.26	NA	No	Constituent not detected.
1,3-Dichloropropane	0 / 110	ND	ND	ND	0.0025	0.26	2000	No	Constituent not detected.
1,4-Dichlorobenzene	0 / 110	ND	ND	ND	0.0025	0.26	12	No	Constituent not detected.
1,4-Dioxane	2 / 103	0.067	0.074	S14-2-5	0.1	10	17	No	Maximum detect below screening value.
2,2-Dichloropropane	0 / 110	ND	ND	ND	0.0025	0.26	NA	No	Constituent not detected.
2-Butanone	1 / 110	0.032	0.032	S14-2-2	0.0051	1.3	20000	No	Maximum detect below screening value.
2-Chloroethyl vinyl ether	0 / 96	ND	ND	ND	0.013	1.3	NA	No	Constituent not detected.
2-Chlorotoluene	0 / 110	ND	ND	ND	0.0025	0.26	2000	No	Constituent not detected.
2-Hexanone (methyl butyl ketone)	0 / 110	ND	ND	ND	0.0101	1.3	140	No	Constituent not detected.
3-Chloro-1,2-dibromopropane	0 / 7	ND	ND	ND	0.0051	0.011	0.069	No	Constituent not detected.
4-Chlorotoluene	0 / 110	ND	ND	ND	0.0025	0.26	2000	No	Constituent not detected.
4-Isopropyltoluene	0 / 110	ND	ND	ND	0.0025	0.26	NA	No	Constituent not detected.
4-Methyl-2-pentanone	0 / 110	ND	ND	ND	0.0051	1.3	5300	No	Constituent not detected.
Acetone	23 / 110	0.014	0.169	S14-2-2	0.0101	2.6	63000	No	Maximum detect below screening value.
Acrolein	0 / 103	ND	ND	ND	0.013	**1.3**	0.065	No	Constituent not detected.
Acrylonitrile	0 / 103	ND	ND	ND	0.013	**1.3**	1.2	No	Constituent not detected.
Benzene	0 / 110	ND	ND	ND	0.0025	0.26	5.4	No	Constituent not detected.
Bromobenzene	0 / 110	ND	ND	ND	0.0025	0.26	180	No	Constituent not detected.
Bromochloromethane	0 / 110	ND	ND	ND	0.0025	0.26	68	No	Constituent not detected.
Bromodichloromethane	0 / 110	ND	ND	ND	0.0025	0.26	1.4	No	Constituent not detected.

TABLE 2-6
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - WESTERN AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Volatile Organics (continued)									
Bromoform	0 / 110	ND	ND	ND	0.0025	0.26	220	No	Constituent not detected.
Bromomethane	0 / 110	ND	ND	ND	0.0025	0.26	3.2	No	Constituent not detected.
Carbon Disulfide	0 / 110	ND	ND	ND	0.0025	0.26	370	No	Constituent not detected.
Carbon Tetrachloride	0 / 110	ND	ND	ND	0.0025	0.26	3	No	Constituent not detected.
Chlorobenzene	0 / 110	ND	ND	ND	0.0025	0.26	140	No	Constituent not detected.
Dibromochloromethane	0 / 110	ND	ND	ND	0.0025	0.26	3.3	No	Constituent not detected.
Chloroethane	0 / 110	ND	ND	ND	0.0025	0.26	6100	No	Constituent not detected.
Chloroform	0 / 110	ND	ND	ND	0.0025	0.26	1.5	No	Constituent not detected.
Chloromethane	0 / 110	ND	ND	ND	0.0025	0.26	50	No	Constituent not detected.
Cis-1,2-Dichloroethene	22 / 110	0.00084	3.76	S14-4-0.5	0.0025	0.0078	200	No	Maximum detect below screening value.
Cis-1,3-Dichloropropene	0 / 110	ND	ND	ND	0.0025	0.26	NA	No	Constituent not detected.
Dibromomethane	0 / 110	ND	ND	ND	0.0025	0.26	11	No	Constituent not detected.
Dichlorodifluoromethane	0 / 110	ND	ND	ND	0.0025	0.26	40	No	Constituent not detected.
Ethylbenzene	0 / 110	ND	ND	ND	0.0025	0.26	27	No	Constituent not detected.
Hexachlorobutadiene	1 / 110	0.242	0.242	S14-3-0.5	0.0025	0.26	22	No	Maximum detect below screening value.
Isopropylbenzene	0 / 110	ND	ND	ND	0.0025	0.26	1100	No	Constituent not detected.
m,p-Xylenes [2]	1 / 103	0.409	0.409	S24-3-2	0.0052	0.51	250	No	Maximum detect below screening value.
Methyl tert-butyl ether	0 / 110	ND	ND	ND	0.0025	0.26	220	No	Constituent not detected.
Methylene chloride	1 / 110	0.0052	0.0052	S14-2-0.5	0.0025	0.51	310	No	Maximum detect below screening value.
Naphthalene	0 / 110	ND	ND	ND	0.0026	0.26	18	No	Constituent not detected.
N-Butylbenzene	0 / 110	ND	ND	ND	0.0025	0.26	5100	No	Constituent not detected.
N-Propylbenzene	0 / 110	ND	ND	ND	0.0025	0.26	2100	No	Constituent not detected.
o-Xylene	1 / 103	0.199	0.199	S24-3-2	0.0026	0.26	300	No	Maximum detect below screening value.
Sec-Butylbenzene	0 / 110	ND	ND	ND	0.0025	0.26	10000	No	Constituent not detected.
Styrene	0 / 110	ND	ND	ND	0.0025	0.26	3600	No	Constituent not detected.
Tert-Butylbenzene	0 / 110	ND	ND	ND	0.0025	0.26	10000	No	Constituent not detected.
Tetrachloroethene	101 / 110	0.0012	109	S24-3-2	0.0025	0.0068	41	**YES**	Maximum detect exceeds screening value.
Toluene	4 / 110	0.00091	0.424	S24-3-2	0.0025	0.26	4500	No	Maximum detect below screening value.
Total Xylenes	1 / 109	0.608	0.608	S24-3-2	0.0025	0.51	270	No	Maximum detect below screening value.
Trans-1,2-Dichloroethene	6 / 110	0.0012	0.376	S14-4-0.5	0.0025	0.0078	69	No	Maximum detect below screening value.
Trans-1,3-Dichloropropene	0 / 110	ND	ND	ND	0.0025	0.26	NA	No	Constituent not detected.
Trichloroethene	37 / 110	0.00083	31.7	S14-4-0.5	0.0025	0.0073	2	**YES**	Maximum detect exceeds screening value.
Trichlorofluoromethane	0 / 110	ND	ND	ND	0.0025	0.26	340	No	Constituent not detected.
Vinyl Acetate	0 / 103	ND	ND	ND	0.013	1.3	410	No	Constituent not detected.
Vinyl Chloride	0 / 110	ND	ND	ND	0.0025	0.26	1.7	No	Constituent not detected.
Dibromochloropropane (DBCP)	0 / 103	ND	ND	ND	0.0026	0.26	NA	No	Constituent not detected.

TABLE 2-6
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - WESTERN AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
VOCs - Method 3810 Mod									
Benzene	0 / 89	ND	ND	ND	0.0084	0.0084	5.4	No	Constituent not detected.
Cis-1,2-Dichloroethene	5 / 89	0.027	0.917	S18-19-15	0.0084	0.0084	200	No	Maximum detect below screening value.
Ethylbenzene	0 / 89	ND	ND	ND	0.0084	0.0084	27	No	Constituent not detected.
Tetrachloroethene	47 / 89	0.007	29.5	S18-11-5	0.0084	0.0084	41	No	Maximum detect below screening value.
Toluene	0 / 89	ND	ND	ND	0.0084	0.0084	4500	No	Constituent not detected.
Trichloroethene	13 / 88	0.0042	0.171	S14-8-0.5	0.0084	0.0084	2	No	Maximum detect below screening value.
Total Xylenes	0 / 88	ND	ND	ND	0.0084	0.0084	270	No	Constituent not detected.
Semi-Volatile Organics									
1,2,4-Trichlorobenzene	0 / 19	ND	ND	ND	0.17	0.21	27	No	Constituent not detected.
1,2-Dichlorobenzene	0 / 19	ND	ND	ND	0.17	0.21	980	No	Constituent not detected.
1,2-Diphenylhydrazine	0 / 19	ND	ND	ND	0.17	0.21	2.2	No	Constituent not detected.
1,3-Dichlorobenzene	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
1,4-Dichlorobenzene	0 / 19	ND	ND	ND	0.17	0.21	12	No	Constituent not detected.
1-Methylnaphthalene	5 / 19	0.042	0.099	S14-3-2	0.19	0.21	53	No	Maximum detect below screening value.
2,4,5-Trichlorophenol	0 / 19	ND	ND	ND	0.17	0.21	6200	No	Constituent not detected.
2,4,6-Trichlorophenol	0 / 19	ND	ND	ND	0.17	0.21	62	No	Constituent not detected.
2,4-Dichlorophenol	0 / 19	ND	ND	ND	0.17	0.21	180	No	Constituent not detected.
2,4-Dimethylphenol	0 / 19	ND	ND	ND	0.17	0.21	1200	No	Constituent not detected.
2,4-Dinitrophenol	0 / 19	ND	ND	ND	0.85	1.1	120	No	Constituent not detected.
2,4-Dinitrotoluene	0 / 19	ND	ND	ND	0.17	0.21	5.5	No	Constituent not detected.
2,6-Dinitrotoluene	0 / 19	ND	ND	ND	0.17	0.21	1.2	No	Constituent not detected.
2-Chloronaphthalene	0 / 19	ND	ND	ND	0.17	0.21	8200	No	Constituent not detected.
2-Chlorophenol	0 / 19	ND	ND	ND	0.17	0.21	510	No	Constituent not detected.
2-Methylnaphthalene	6 / 19	0.025	0.101	S14-3-2	0.19	0.21	220	No	Maximum detect below screening value.
2-Methylphenol	0 / 19	ND	ND	ND	0.17	0.21	3100	No	Constituent not detected.
2-Nitroaniline	0 / 19	ND	ND	ND	0.17	0.21	600	No	Constituent not detected.
2-Nitrophenol	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
3,3'-Dichlorobenzidine	0 / 18	ND	ND	ND	0.17	0.21	3.8	No	Constituent not detected.
3-Nitroaniline	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
4,6-Dinitro-2-methylphenol	0 / 19	ND	ND	ND	0.34	0.42	4.9	No	Constituent not detected.
4-Bromophenyl phenyl ether	0 / 18	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
4-Chloro-3-Methylphenol	0 / 19	ND	ND	ND	0.17	0.21	6200	No	Constituent not detected.
4-Chloroaniline	0 / 19	ND	ND	ND	0.17	0.21	8.6	No	Constituent not detected.
4-Chlorophenyl phenyl ether	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
4-Nitroaniline	0 / 19	ND	ND	ND	0.17	0.21	86	No	Constituent not detected.

TABLE 2-6
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - WESTERN AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
4-Nitrophenol	0 / 18	ND	ND	ND	0.85	1.1	NA	No	Constituent not detected.
Acenaphthene	0 / 19	ND	ND	ND	0.17	0.21	3300	No	Constituent not detected.
Acenaphthylene	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
Aniline	0 / 19	ND	ND	ND	0.17	0.21	300	No	Constituent not detected.
Anthracene	3 / 19	0.026	0.033	S14-4-0.5	0.17	0.21	17000	No	Maximum detect below screening value.
Benzidine	0 / 19	ND	ND	ND	**1.7**	**2.1**	0.0075	No	Constituent not detected.
Benzo(a)anthracene	7 / 19	0.0284	0.114	S14-3-0.5	0.17	0.21	2.1	No	Maximum detect below screening value.
Benzo(a)pyrene	7 / 19	0.027	0.098	S14-3-0.5	0.17	0.21	0.21	No	Maximum detect below screening value.
Benzo(b)fluoranthene	7 / 19	0.043	0.155	S14-3-0.5	0.17	0.21	2.1	No	Maximum detect below screening value.
Benzo(g,h,i)perylene [3]	7 / 19	0.041	0.104	S14-4-0.5	0.17	0.21	1700	No	Maximum detect below screening value.
Benzo(k)fluoranthene	5 / 19	0.024	0.074	S13-4-0.5	0.17	0.21	21	No	Maximum detect below screening value.
Benzoic Acid	0 / 19	ND	ND	ND	0.85	1.1	250000	No	Constituent not detected.
Benzyl Alcohol	0 / 19	ND	ND	ND	0.17	0.21	6200	No	Constituent not detected.
Bis(2-Chloroethoxy)methane	0 / 19	ND	ND	ND	0.17	0.21	180	No	Constituent not detected.
Bis(2-Chloroethyl)ether	0 / 19	ND	ND	ND	0.17	0.21	1	No	Constituent not detected.
Bis(2-Chloroisopropyl)ether	0 / 19	ND	ND	ND	0.17	0.21	22	No	Constituent not detected.
Bis(2-Ethylhexyl) phthalate	4 / 19	0.284	1.93	S14-3-0.5	0.34	0.42	120	No	Maximum detect below screening value.
Butyl benzyl phthalate	1 / 19	0.040	0.040	S14-3-0.5	0.17	0.21	910	No	Maximum detect below screening value.
Carbazole	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
Chrysene	8 / 19	0.027	0.128	S14-3-0.5	0.17	0.21	210	No	Maximum detect below screening value.
Dibenz(a,h)anthracene	1 / 19	0.022	0.022	S14-3-0.5	0.17	0.21	0.21	No	Maximum detect below screening value.
Dibenzofuran	3 / 19	0.0256	0.052	S14-3-2	0.17	0.21	100	No	Maximum detect below screening value.
Diethyl Phthalate	0 / 19	ND	ND	ND	0.34	0.42	49000	No	Constituent not detected.
Dimethyl Phthalate	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
Di-N-butyl phthalate	2 / 19	0.040	0.308	S14-3-0.5	0.34	0.42	6200	No	Maximum detect below screening value.
Di-N-octyl phthalate	0 / 19	ND	ND	ND	0.17	0.21	620	No	Constituent not detected.
Fluoranthene	8 / 19	0.031	0.196	S14-3-0.5	0.17	0.21	2200	No	Maximum detect below screening value.
Fluorene	0 / 19	ND	ND	ND	0.17	0.21	2200	No	Constituent not detected.
Hexachloro-1,3-cyclopentadiene	0 / 19	ND	ND	ND	0.17	0.21	370	No	Constituent not detected.
Hexachlorobenzene	1 / 19	0.043	0.043	S14-3-0.5	0.17	0.21	1.1	No	Maximum detect below screening value.
Hexachlorobutadiene	1 / 19	0.035	0.035	S14-3-2	0.17	0.21	22	No	Maximum detect below screening value.
Hexachloroethane	0 / 19	ND	ND	ND	0.17	0.21	43	No	Constituent not detected.
Indeno(1,2,3-cd)pyrene	7 / 19	0.029	0.0785	S13-4-0.5	0.17	0.21	2.1	No	Maximum detect below screening value.

TABLE 2-6
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - WESTERN AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
Isophorone	2 / 19	0.075	0.085	S24-2-0.5	0.17	0.21	1800	No	Maximum detect below screening value.
m-,p-Cresol mixture	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
Naphthalene	3 / 19	0.024	0.04	S14-3-2	0.17	0.21	18	No	Maximum detect below screening value.
Nitrobenzene	0 / 19	ND	ND	ND	0.17	0.21	24	No	Constituent not detected.
N-Nitrosodimethylamine	0 / 19	ND	ND	ND	**0.34**	**0.42**	0.034	No	Constituent not detected.
N-Nitrosodi-N-propylamine	0 / 19	ND	ND	ND	0.17	0.21	0.25	No	Constituent not detected.
N-Nitrosodiphenylamine	0 / 19	ND	ND	ND	0.17	0.21	350	No	Constituent not detected.
Pentachlorophenol	0 / 19	ND	ND	ND	0.85	1.1	2.7	No	Constituent not detected.
Phenanthrene [4]	8 / 19	0.0294	0.192	S14-3-2	0.17	0.21	17000	No	Maximum detect below screening value.
Phenol	0 / 19	ND	ND	ND	0.17	0.21	18000	No	Constituent not detected.
Pyrene	8 / 19	0.0319	0.206	S14-3-0.5	0.17	0.21	1700	No	Maximum detect below screening value.
Pyridine	0 / 19	ND	ND	ND	0.34	0.42	100	No	Constituent not detected.
Total Metals									
Arsenic	33 / 33	0.47	170	S13-2-2	- -	- -	2.4	**YES**	Maximum detect exceeds screening value.
Barium	23 / 23	9.1	191	S18-4-25	- -	- -	19000	No	Maximum detect below screening value.
Cadmium	10 / 33	0.17	1.3	S13-4-0.5	0.15	1.2	80	No	Maximum detect below screening value.
Calcium	4 / 4	261	3110	S18-4-5	- -	- -	NA	No	Essential Nutrient.
Chromium [5]	33 / 33	1	30	S13-1-2	- -	- -	128572	No	Maximum detect below screening value.
Iron	4 / 4	2150	10400	S18-4-5	- -	- -	72000	No	Maximum detect below screening value.
Lead	33 / 33	1.5	720	S14-4-0.5	- -	- -	800	No	Maximum detect below screening value.
Manganese	4 / 4	20.5	155	S18-4-5	- -	- -	2300	No	Maximum detect below screening value.
Magnesium	3 / 4	598	2480	S18-4-5	220	220	NA	No	Essential Nutrient.
Mercury	7 / 33	0.046	0.086	S14-3-0.5	0.041	0.049	4.3	No	Maximum detect below screening value.
Potassium	2 / 4	1300	1610	S18-4-5	380	440	NA	No	Essential Nutrient.
Selenium	1 / 33	1.2	1.2	S14-3-2	0.65	5.9	510	No	Maximum detect below screening value.
Silver	0 / 33	ND	ND	ND	0.33	3	510	No	Constituent not detected.
Sodium	0 / 4	ND	ND	ND	380	1500	NA	No	Constituent not detected.

Notes:
ND - Not Detected
NA - Not Available
"- -" - Constituent detected in every sample; detection limit not presented.
[1] Regional Screening Levels (RSLs) for industrial direct contact from USEPA (2013a). Non-cancer based screening levels reflect a hazard quotient of 0.1.
[2] The RSL for m,p-xylenes is conservatively based on the RSL for m-xylene.
[3] The RSL for benzo(g,h,i)perylene is based on the RSL for pyrene.
[4] The RSL for phenanthrene is based on the RSL for anthracene.
[6] Site-specific SSL for total chromium is based on the assumption that hexavalent and trivalent chromium are present at a ratio of 1:6 (Cr IV to Cr III). See text Section 2.4.1.
Bold detection limits indicates the value exceeds the RSL.

TABLE 2-7
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - WESTERN AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Volatile Organics									
1,1,1,2-Tetrachloroethane	0 / 110	ND	ND	ND	0.0025	**0.26**	0.0046	No	Constituent not detected.
1,1,1-Trichloroethane	41 / 110	0.0008	0.277	S14-4-0.5	0.0025	0.0073	6.27	No	Maximum detect below screening value.
1,1,2,2-Tetrachloroethane	0 / 110	ND	ND	ND	**0.0025**	**0.26**	0.00063	No	Constituent not detected.
1,1,2-Trichloroethane	0 / 110	ND	ND	ND	**0.0025**	**0.26**	0.00031	No	Constituent not detected.
1,1-Dichloroethane	12 / 110	0.0011	0.195	S14-4-0.5	0.0025	0.0078	0.016	**YES**	Maximum detect exceeds screening value.
1,1-Dichloroethene	4 / 110	0.0012	0.0037	S14-3-2	0.0025	**0.26**	0.22	No	Maximum detect below screening value.
1,1-Dichloropropene	0 / 110	ND	ND	ND	0.0025	0.26	NA	No	Constituent not detected.
1,2,3-Trichlorobenzene	0 / 110	ND	ND	ND	0.0025	**0.26**	0.036	No	Constituent not detected.
1,2,3-Trichloropropane	0 / 110	ND	ND	ND	**0.0025**	**0.26**	0.0000067	No	Constituent not detected.
1,2,4-Trichlorobenzene	0 / 110	ND	ND	ND	0.0025	**0.26**	0.027	No	Constituent not detected.
1,2,4-Trimethylbenzene	1 / 110	0.074	0.074	S24-3-2	0.0025	**0.26**	0.051	**YES**	Maximum detect exceeds screening value.
1,2-Dibromoethane	0 / 110	ND	ND	ND	**0.0025**	**0.26**	0.000043	No	Constituent not detected.
1,2-Dichlorobenzene	0 / 110	ND	ND	ND	0.0025	0.26	0.65	No	Constituent not detected.
1,2-Dichloroethane	0 / 110	ND	ND	ND	**0.0025**	**0.26**	0.001	No	Constituent not detected.
1,2-Dichloroethene, Total	0 / 7	ND	ND	ND	0.0025	0.0055	0.089	No	Constituent not detected.
1,2-Dichloropropane	1 / 110	0.0013	0.0013	S13-4-0.5	0.0025	**0.26**	0.0031	No	Maximum detect below screening value.
1,3,5-Trimethylbenzene	0 / 110	ND	ND	ND	0.0025	0.26	0.29	No	Constituent not detected.
1,3-Dichlorobenzene	0 / 110	ND	ND	ND	0.0025	0.26	NA	No	Constituent not detected.
1,3-Dichloropropane	0 / 110	ND	ND	ND	0.0025	**0.26**	0.24	No	Constituent not detected.
1,4-Dichlorobenzene	0 / 110	ND	ND	ND	0.0025	**0.26**	0.0096	No	Constituent not detected.
1,4-Dioxane	2 / 103	0.067	0.074	S14-2-5	**0.1**	**10**	0.0034	**YES**	Maximum detect exceeds screening value.
2,2-Dichloropropane	0 / 110	ND	ND	ND	0.0025	0.26	NA	No	Constituent not detected.
2-Butanone	1 / 110	0.032	0.032	S14-2-2	0.0051	1.3	2.41	No	Maximum detect below screening value.
2-Chloroethyl vinyl ether	0 / 96	ND	ND	ND	0.013	1.3	NA	No	Constituent not detected.
2-Chlorotoluene	0 / 110	ND	ND	ND	0.0025	0.26	0.41	No	Constituent not detected.
2-Hexanone (methyl butyl ketone)	0 / 110	ND	ND	ND	0.0101	**1.3**	0.019	No	Constituent not detected.
3-Chloro-1,2-dibromopropane	0 / 7	ND	ND	ND	**0.0051**	**0.011**	0.0000034	No	Constituent not detected.
4-Chlorotoluene	0 / 110	ND	ND	ND	0.0025	0.26	0.43	No	Constituent not detected.
4-Isopropyltoluene	0 / 110	ND	ND	ND	0.0025	0.26	NA	No	Constituent not detected.
4-Methyl-2-pentanone	0 / 110	ND	ND	ND	0.0051	**1.3**	0.55	No	Constituent not detected.
Acetone	23 / 110	0.014	0.169	S14-2-2	0.0101	2.6	5.78	No	Maximum detect below screening value.
Acrolein	0 / 103	ND	ND	ND	**0.013**	**1.3**	0.00002	No	Constituent not detected.
Acrylonitrile	0 / 103	ND	ND	ND	**0.013**	**1.3**	0.00024	No	Constituent not detected.
Benzene	0 / 110	ND	ND	ND	0.0025	**0.26**	0.0048	No	Constituent not detected.
Bromobenzene	0 / 110	ND	ND	ND	0.0025	**0.26**	0.087	No	Constituent not detected.
Bromochloromethane	0 / 110	ND	ND	ND	0.0025	**0.26**	0.051	No	Constituent not detected.
Bromodichloromethane	0 / 110	ND	ND	ND	**0.0025**	**0.26**	0.00077	No	Constituent not detected.

TABLE 2-7
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - WESTERN AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Volatile Organics (continued)									
Bromoform	0 / 110	ND	ND	ND	0.0025	**0.26**	0.051	No	Constituent not detected.
Bromomethane	0 / 110	ND	ND	ND	0.0025	**0.26**	0.0043	No	Constituent not detected.
Carbon Disulfide	0 / 110	ND	ND	ND	0.0025	0.26	0.51	No	Constituent not detected.
Carbon Tetrachloride	0 / 110	ND	ND	ND	0.0025	**0.26**	0.0036	No	Constituent not detected.
Chlorobenzene	0 / 110	ND	ND	ND	0.0025	**0.26**	0.12	No	Constituent not detected.
Dibromochloromethane	0 / 110	ND	ND	ND	**0.0025**	**0.26**	0.00094	No	Constituent not detected.
Chloroethane	0 / 110	ND	ND	ND	0.0025	0.26	14.2	No	Constituent not detected.
Chloroform	0 / 110	ND	ND	ND	**0.0025**	**0.26**	0.0013	No	Constituent not detected.
Chloromethane	0 / 110	ND	ND	ND	0.0025	**0.26**	0.12	No	Constituent not detected.
Cis-1,2-Dichloroethene	22 / 110	0.00084	3.76	S14-4-0.5	0.0025	0.0078	0.020	**YES**	Maximum detect exceeds screening value.
Cis-1,3-Dichloropropene	0 / 110	ND	ND	ND	0.0025	0.26	NA	No	Constituent not detected.
Dibromomethane	0 / 110	ND	ND	ND	0.0025	**0.26**	0.0046	No	Constituent not detected.
Dichlorodifluoromethane	0 / 110	ND	ND	ND	0.0025	0.26	0.72	No	Constituent not detected.
Ethylbenzene	0 / 110	ND	ND	ND	0.0025	**0.26**	0.036	No	Constituent not detected.
Hexachlorobutadiene	1 / 110	0.242	0.242	S14-3-0.5	0.0025	**0.26**	0.012	**YES**	Maximum detect exceeds screening value.
Isopropylbenzene	0 / 110	ND	ND	ND	0.0025	0.26	1.54	No	Constituent not detected.
m,p-Xylenes [2]	1 / 103	0.409	0.409	S24-3-2	0.0052	**0.51**	0.43	No	Maximum detect below screening value.
Methyl tert-butyl ether	0 / 110	ND	ND	ND	0.0025	**0.26**	0.067	No	Constituent not detected.
Methylene chloride	1 / 110	0.0052	0.0052	S14-2-0.5	0.0025	**0.51**	0.053	No	Maximum detect below screening value.
Naphthalene	0 / 110	ND	ND	ND	0.0026	**0.26**	0.011	No	Constituent not detected.
N-Butylbenzene	0 / 110	ND	ND	ND	0.0025	0.26	6.025	No	Constituent not detected.
N-Propylbenzene	0 / 110	ND	ND	ND	0.0025	0.26	2.39	No	Constituent not detected.
o-Xylene	1 / 103	0.199	0.199	S24-3-2	0.0026	0.26	0.46	No	Maximum detect below screening value.
Sec-Butylbenzene	0 / 110	ND	ND	ND	0.0025	0.26	11.1	No	Constituent not detected.
Styrene	0 / 110	ND	ND	ND	0.0025	0.26	2.89	No	Constituent not detected.
Tert-Butylbenzene	0 / 110	ND	ND	ND	0.0025	0.26	2.65	No	Constituent not detected.
Tetrachloroethene	101 / 110	0.0012	109	S24-3-2	0.0025	0.0068	0.039	**YES**	Maximum detect exceeds screening value.
Toluene	4 / 110	0.00091	0.424	S24-3-2	0.0025	0.26	1.42	No	Maximum detect below screening value.
Total Xylenes	1 / 109	0.608	0.608	S24-3-2	0.0025	**0.51**	0.46	**YES**	Maximum detect exceeds screening value.
Trans-1,2-Dichloroethene	6 / 110	0.0012	0.376	S14-4-0.5	0.0025	0.0078	0.060	**YES**	Maximum detect exceeds screening value.
Trans-1,3-Dichloropropene	0 / 110	ND	ND	ND	0.0025	0.26	NA	No	Constituent not detected.
Trichloroethene	37 / 110	0.00083	31.7	S14-4-0.5	**0.0025**	**0.0073**	0.0022	**YES**	Maximum detect exceeds screening value.
Trichlorofluoromethane	0 / 110	ND	ND	ND	0.0025	0.26	1.66	No	Constituent not detected.
Vinyl Acetate	0 / 103	ND	ND	ND	0.013	**1.3**	0.21	No	Constituent not detected.
Vinyl Chloride	0 / 110	ND	ND	ND	**0.0025**	**0.26**	0.00013	No	Constituent not detected.
Dibromochloropropane (DBCP)	0 / 103	ND	ND	ND	0.0026	0.26	NA	No	Constituent not detected.

TABLE 2-7
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - WESTERN AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
VOCs - Method 3810 Mod									
Benzene	0 / 89	ND	ND	ND	**0.0084**	**0.0084**	0.0048	No	Constituent not detected.
Cis-1,2-Dichloroethene	5 / 89	0.027	0.917	S18-19-15	0.0084	0.0084	0.02	**YES**	Maximum detect exceeds screening value.
Ethylbenzene	0 / 89	ND	ND	ND	0.0084	0.0084	0.036	No	Constituent not detected.
Tetrachloroethene	47 / 89	0.007	29.5	S18-11-5	0.0084	0.0084	0.039	**YES**	Maximum detect exceeds screening value.
Toluene	0 / 89	ND	ND	ND	0.0084	0.0084	1.42	No	Constituent not detected.
Trichloroethene	13 / 88	0.0042	0.171	S14-8-0.5	**0.0084**	**0.0084**	0.0022	**YES**	Maximum detect exceeds screening value.
Total Xylenes	0 / 88	ND	ND	ND	0.0084	0.0084	0.46	No	Constituent not detected.
Semi-Volatile Organics									
1,2,4-Trichlorobenzene	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.027	No	Constituent not detected.
1,2-Dichlorobenzene	0 / 19	ND	ND	ND	0.17	0.21	0.65	No	Constituent not detected.
1,2-Diphenylhydrazine	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.0053	No	Constituent not detected.
1,3-Dichlorobenzene	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
1,4-Dichlorobenzene	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.0096	No	Constituent not detected.
1-Methylnaphthalene	5 / 19	0.042	0.099	S14-3-2	**0.19**	**0.21**	0.12	No	Maximum detect below screening value.
2,4,5-Trichlorophenol	0 / 19	ND	ND	ND	0.17	0.21	7.95	No	Constituent not detected.
2,4,6-Trichlorophenol	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.082	No	Constituent not detected.
2,4-Dichlorophenol	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.099	No	Constituent not detected.
2,4-Dimethylphenol	0 / 19	ND	ND	ND	0.17	0.21	0.77	No	Constituent not detected.
2,4-Dinitrophenol	0 / 19	ND	ND	ND	**0.85**	**1.1**	0.082	No	Constituent not detected.
2,4-Dinitrotoluene	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.0067	No	Constituent not detected.
2,6-Dinitrotoluene	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.0014	No	Constituent not detected.
2-Chloronaphthalene	0 / 19	ND	ND	ND	0.17	0.21	6.99	No	Constituent not detected.
2-Chlorophenol	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.14	No	Constituent not detected.
2-Methylnaphthalene	6 / 19	0.025	0.101	S14-3-2	0.19	0.21	0.34	No	Maximum detect below screening value.
2-Methylphenol	0 / 19	ND	ND	ND	0.17	0.21	1.40	No	Constituent not detected.
2-Nitroaniline	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.15	No	Constituent not detected.
2-Nitrophenol	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
3,3'-Dichlorobenzidine	0 / 18	ND	ND	ND	**0.17**	**0.21**	0.017	No	Constituent not detected.
3-Nitroaniline	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
4,6-Dinitro-2-methylphenol	0 / 19	ND	ND	ND	**0.34**	**0.42**	0.0048	No	Constituent not detected.
4-Bromophenyl phenyl ether	0 / 18	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
4-Chloro-3-Methylphenol	0 / 19	ND	ND	ND	0.17	0.21	3.13	No	Constituent not detected.
4-Chloroaniline	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.0031	No	Constituent not detected.
4-Chlorophenyl phenyl ether	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
4-Nitroaniline	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.034	No	Constituent not detected.

TABLE 2-7
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - WESTERN AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
4-Nitrophenol	0 / 18	ND	ND	ND	0.85	1.1	NA	No	Constituent not detected.
Acenaphthene	0 / 19	ND	ND	ND	0.17	0.21	9.88	No	Constituent not detected.
Acenaphthylene	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
Aniline	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.089	No	Constituent not detected.
Anthracene	3 / 19	0.026	0.033	S14-4-0.5	0.17	0.21	101	No	Maximum detect below screening value.
Benzidine	0 / 19	ND	ND	ND	**1.7**	**2.1**	0.0000058	No	Constituent not detected.
Benzo(a)anthracene	7 / 19	0.0284	0.114	S14-3-0.5	0.17	0.21	0.24	No	Maximum detect below screening value.
Benzo(a)pyrene	7 / 19	0.027	0.098	S14-3-0.5	**0.17**	**0.21**	0.084	**YES**	Maximum detect exceeds screening value.
Benzo(b)fluoranthene	7 / 19	0.043	0.155	S14-3-0.5	0.17	0.21	0.84	No	Maximum detect below screening value.
Benzo(g,h,i)perylene [3]	7 / 19	0.041	0.104	S14-4-0.5	0.17	0.21	22.9	No	Maximum detect below screening value.
Benzo(k)fluoranthene	5 / 19	0.024	0.074	S13-4-0.5	0.17	0.21	8.44	No	Maximum detect below screening value.
Benzoic Acid	0 / 19	ND	ND	ND	0.85	1.1	33.7	No	Constituent not detected.
Benzyl Alcohol	0 / 19	ND	ND	ND	0.17	0.21	0.89	No	Constituent not detected.
Bis(2-Chloroethoxy)methane	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.027	No	Constituent not detected.
Bis(2-Chloroethyl)ether	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.000075	No	Constituent not detected.
Bis(2-Chloroisopropyl)ether	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.0027	No	Constituent not detected.
Bis(2-Ethylhexyl) phthalate	4 / 19	0.284	1.93	S14-3-0.5	0.34	0.42	26.5	No	Maximum detect below screening value.
Butyl benzyl phthalate	1 / 19	0.040	0.040	S14-3-0.5	0.17	0.21	4.82	No	Maximum detect below screening value.
Carbazole	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
Chrysene	8 / 19	0.027	0.128	S14-3-0.5	0.17	0.21	26.5	No	Maximum detect below screening value.
Dibenz(a,h)anthracene	1 / 19	0.022	0.022	S14-3-0.5	0.17	0.21	0.27	No	Maximum detect below screening value.
Dibenzofuran	3 / 19	0.0256	0.052	S14-3-2	0.17	0.21	0.27	No	Maximum detect below screening value.
Diethyl Phthalate	0 / 19	ND	ND	ND	0.34	0.42	11.3	No	Constituent not detected.
Dimethyl Phthalate	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
Di-N-butyl phthalate	2 / 19	0.040	0.308	S14-3-0.5	0.34	0.42	4.097	No	Maximum detect below screening value.
Di-N-octyl phthalate	0 / 19	ND	ND	ND	0.17	0.21	106	No	Constituent not detected.
Fluoranthene	8 / 19	0.031	0.196	S14-3-0.5	0.17	0.21	169	No	Maximum detect below screening value.
Fluorene	0 / 19	ND	ND	ND	0.17	0.21	9.64	No	Constituent not detected.
Hexachloro-1,3-cyclopentadiene	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.17	No	Constituent not detected.
Hexachlorobenzene	1 / 19	0.043	0.043	S14-3-0.5	**0.17**	**0.21**	0.013	**YES**	Maximum detect exceeds screening value.
Hexachlorobutadiene	1 / 19	0.035	0.035	S14-3-2	**0.17**	**0.21**	0.012	**YES**	Maximum detect exceeds screening value.
Hexachloroethane	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.0075	No	Constituent not detected.
Indeno(1,2,3-cd)pyrene	7 / 19	0.029	0.0785	S13-4-0.5	0.17	0.21	4.82	No	Maximum detect below screening value.

TABLE 2-7
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - WESTERN AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
Isophorone	2 / 19	0.075	0.085	S24-2-0.5	0.17	0.21	0.53	No	Maximum detect below screening value.
m-,p-Cresol mixture	0 / 19	ND	ND	ND	0.17	0.21	NA	No	Constituent not detected.
Naphthalene	3 / 19	0.024	0.04	S14-3-2	**0.17**	**0.21**	0.011	**YES**	Maximum detect exceeds screening value.
Nitrobenzene	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.0019	No	Constituent not detected.
N-Nitrosodimethylamine	0 / 19	ND	ND	ND	**0.34**	**0.42**	0.0000024	No	Constituent not detected.
N-Nitrosodi-N-propylamine	0 / 19	ND	ND	ND	**0.17**	**0.21**	0.00017	No	Constituent not detected.
N-Nitrosodiphenylamine	0 / 19	ND	ND	ND	0.17	0.21	1.37	No	Constituent not detected.
Pentachlorophenol	0 / 19	ND	ND	ND	**0.85**	**1.1**	0.0087	No	Constituent not detected.
Phenanthrene [4]	8 / 19	0.0294	0.192	S14-3-2	0.17	0.21	101	No	Maximum detect below screening value.
Phenol	0 / 19	ND	ND	ND	0.17	0.21	6.27	No	Constituent not detected.
Pyrene	8 / 19	0.0319	0.206	S14-3-0.5	0.17	0.21	22.9	No	Maximum detect below screening value.
Pyridine	0 / 19	ND	ND	ND	**0.34**	**0.42**	0.013	No	Constituent not detected.
Total Metals									
Arsenic	33 / 33	0.47	170	S13-2-2	- -	- -	0.031	**YES**	Maximum detect exceeds screening value.
Barium	23 / 23	9.1	191	S18-4-25	- -	- -	289	No	Maximum detect below screening value.
Cadmium	10 / 33	0.17	1.3	S13-4-0.5	0.15	1.2	1.25	**YES**	Maximum detect exceeds screening value.
Calcium	4 / 4	261	3110	S18-4-5	- -	- -	NA	No	Essential Nutrient.
Chromium [5]	33 / 33	1	30	S13-1-2	- -	- -	57840000	No	Maximum detect below screening value.
Iron	4 / 4	2150	10400	S18-4-5	- -	- -	651	**YES**	Maximum detect exceeds screening value.
Lead	33 / 33	1.5	720	S14-4-0.5	- -	- -	NA	No	Screening value not available.
Manganese	4 / 4	20.5	155	S18-4-5	- -	- -	50.6	**YES**	Maximum detect exceeds screening value.
Magnesium	3 / 4	598	2480	S18-4-5	220	220	NA	No	Essential Nutrient.
Mercury	7 / 33	0.046	0.086	S14-3-0.5	0.041	0.049	0.08	**YES**	Maximum detect exceeds screening value.
Potassium	2 / 4	1300	1610	S18-4-5	380	440	NA	No	Essential Nutrient.
Selenium	1 / 33	1.2	1.2	S14-3-2	0.65	**5.9**	0.96	**YES**	Maximum detect exceeds screening value.
Silver	0 / 33	ND	ND	ND	0.33	**3**	1.45	No	Constituent not detected.
Sodium	0 / 4	ND	ND	ND	380	1500	NA	No	Constituent not detected.

Notes:
ND - Not Detected
NA - Not Available
"- -" - Constituent detected in every sample; detection limit not presented.
[1] Risk-Based Soil Screening Levels (SSLs) for protection of groundwater from USEPA (2013a) based on a site specific DAF of 24.1. Non-cancer based screening levels reflect a hazard quotient of 0.1.
[2] The SSL for m,p-xylenes is conservatively based on the SSL for m-xylene.
[3] The SSL for benzo(g,h,i)perylene is based on the SSL for pyrene.
[4] The SSL for phenanthrene is based on the SSL for anthracene.
[5] Site-specific SSL for total chromium is based on the assumption that hexavalent and trivalent chromium are present at a ratio of 1:6 (Cr IV to Cr III). See text Section 2.4.1.
Bold detection limits indicates the value exceeds the RSL.

TABLE 2-8
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Volatile Organics									
1,1,1,2-Tetrachloroethane	0 / 199	ND	ND	ND	0.0018	**23.1**	9.3	No	Constituent not detected.
1,1,1-Trichloroethane	137 / 199	0.0015	10.4	S10-1-10	0.0027	23.1	3800	No	Maximum detect below screening value.
1,1,2,2-Tetrachloroethane	0 / 199	ND	ND	ND	0.0018	**23.1**	2.8	No	Constituent not detected.
1,1,2-Trichloroethane	3 / 199	0.00085	0.0021	DC-3-2	0.0018	**23.1**	0.68	No	Maximum detect below screening value.
1,1-Dichloroethane	116 / 199	0.00058	0.494	DC-3-0.5	0.0025	**23.1**	17	No	Maximum detect below screening value.
1,1-Dichloroethene	98 / 199	0.00105	0.223	S10-1-10	0.0025	23.1	110	No	Maximum detect below screening value.
1,1-Dichloropropene	0 / 199	ND	ND	ND	0.0018	23.1	NA	No	Constituent not detected.
1,2,3-Trichlorobenzene	0 / 199	ND	ND	ND	0.0018	23.1	49	No	Constituent not detected.
1,2,3-Trichloropropane	0 / 199	ND	ND	ND	0.0018	**23.1**	0.095	No	Constituent not detected.
1,2,4-Trichlorobenzene	0 / 199	ND	ND	ND	0.0018	23.1	27	No	Constituent not detected.
1,2,4-Trimethylbenzene	10 / 199	0.001	1230	S20-2-15	0.0018	0.33	26	**YES**	Maximum detect exceeds screening value.
1,2-Dibromoethane	0 / 199	ND	ND	ND	0.0018	**23.1**	0.17	No	Constituent not detected.
1,2-Dichlorobenzene	0 / 199	ND	ND	ND	0.0018	23.1	980	No	Constituent not detected.
1,2-Dichloroethane	0 / 199	ND	ND	ND	0.0018	**23.1**	2.2	No	Constituent not detected.
1,2-Dichloroethene, Total	6 / 20	0.0039	0.262	DC-30-10	0.0027	23.1	920	No	Maximum detect below screening value.
1,2-Dichloropropane	0 / 199	ND	ND	ND	0.0018	**23.1**	4.7	No	Constituent not detected.
1,3,5-Trimethylbenzene	9 / 199	0.00067	330	S20-2-15	0.0018	0.33	1000	No	Maximum detect below screening value.
1,3-Dichlorobenzene	0 / 199	ND	ND	ND	0.0018	23.1	NA	No	Constituent not detected.
1,3-Dichloropropane	0 / 199	ND	ND	ND	0.0018	23.1	2000	No	Constituent not detected.
1,4-Dichlorobenzene	0 / 199	ND	ND	ND	0.0018	**23.1**	12	No	Constituent not detected.
1,4-Dioxane	24 / 179	0.056	13.0	DC-6-0.5	0.073	13	17	No	Maximum detect below screening value.
2,2-Dichloropropane	0 / 199	ND	ND	ND	0.0018	23.1	NA	No	Constituent not detected.
2-Butanone	16 / 199	0.006	0.215	S2-1-0.5	0.0054	46.2	20000	No	Maximum detect below screening value.
2-Chloroethyl vinyl ether	0 / 159	ND	ND	ND	0.0091	1.7	NA	No	Constituent not detected.
2-Chlorotoluene	0 / 199	ND	ND	ND	0.0018	23.1	2000	No	Constituent not detected.
2-Hexanone (methyl butyl ketone)	0 / 199	ND	ND	ND	0.0091	92.4	140	No	Constituent not detected.
3-Chloro-1,2-dibromopropane	0 / 20	ND	ND	ND	0.0054	**46.2**	0.069	No	Constituent not detected.
4-Chlorotoluene	0 / 199	ND	ND	ND	0.0018	23.1	2000	No	Constituent not detected.
4-Isopropyltoluene [2]	4 / 199	0.0024	27.4	S20-2-15	0.0018	1.87	1100	No	Maximum detect below screening value.
4-Methyl-2-pentanone	2 / 199	0.0054	0.02	S2-1-0.5	0.0054	46.2	5300	No	Maximum detect below screening value.
Acetone	56 / 199	0.012	0.249	S4-2-0.5	0.0108	92.4	63000	No	Maximum detect below screening value.
Acrolein	0 / 179	ND	ND	ND	0.0091	**1.7**	0.065	No	Constituent not detected.
Acrylonitrile	0 / 179	ND	ND	ND	0.0091	**1.7**	1.2	No	Constituent not detected.
Benzene	19 / 199	0.00063	0.0046	DC-9-0.5	0.0018	**23.1**	5.4	No	Maximum detect below screening value.
Bromobenzene	0 / 199	ND	ND	ND	0.0018	23.1	180	No	Constituent not detected.
Bromochloromethane	0 / 199	ND	ND	ND	0.0018	23.1	68	No	Constituent not detected.
Bromodichloromethane	0 / 199	ND	ND	ND	0.0018	**23.1**	1.4	No	Constituent not detected.

TABLE 2-8
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Volatile Organics (continued)									
Bromoform	0 / 199	ND	ND	ND	0.0018	23.1	220	No	Constituent not detected.
Bromomethane	0 / 199	ND	ND	ND	0.0018	**23.1**	3.2	No	Constituent not detected.
Carbon Disulfide	10 / 197	0.0019	0.006	DC-20-0.5	0.0018	23.1	370	No	Maximum detect below screening value.
Carbon Tetrachloride	2 / 199	0.00094	0.00099	S1-1-10	0.0018	**23.1**	3	No	Maximum detect below screening value.
Chlorobenzene	1 / 199	0.0012	0.0012	S20-1-INT	0.0018	23.1	140	No	Maximum detect below screening value.
Dibromochloromethane	0 / 199	ND	ND	ND	0.0018	**23.1**	3.3	No	Constituent not detected.
Chloroethane	5 / 199	0.0026	0.032	DC-9-0.5	0.0018	23.1	6100	No	Maximum detect below screening value.
Chloroform	28 / 199	0.00066	0.0039	DC-3-0.5	0.0018	**23.1**	1.5	No	Maximum detect below screening value.
Chloromethane	0 / 199	ND	ND	ND	0.0018	23.1	50	No	Constituent not detected.
Cis-1,2-Dichloroethene	141 / 199	0.00083	52.1	DC-3-0.5	0.0025	23.1	200	No	Maximum detect below screening value.
Cis-1,3-Dichloropropene	0 / 199	ND	ND	ND	0.0018	23.1	NA	No	Constituent not detected.
Dibromomethane	0 / 199	ND	ND	ND	0.0018	**23.1**	11	No	Constituent not detected.
Dichlorodifluoromethane	0 / 199	ND	ND	ND	0.0018	23.1	40	No	Constituent not detected.
Ethylbenzene	15 / 199	0.00091	98.7	S20-2-15	0.0018	0.33	27	**YES**	Maximum detect exceeds screening value.
Hexachlorobutadiene	0 / 199	ND	ND	ND	0.0018	**23.1**	22	No	Constituent not detected.
Isopropylbenzene	10 / 199	0.0025	46.4	S20-2-15	0.0018	1.87	1100	No	Maximum detect below screening value.
m,p-Xylenes [3]	14 / 179	0.0019	1.34	DC-15-0.5	0.0036	0.67	250	No	Maximum detect below screening value.
Methyl tert-butyl ether	5 / 195	0.0006	0.0024	S1-2-2	0.0018	23.1	220	No	Maximum detect below screening value.
Methylene chloride	5 / 199	0.0026	0.13	S10-1-INT	0.0027	23.1	310	No	Maximum detect below screening value.
Naphthalene	7 / 199	0.0037	179	S20-2-15	0.0018	3.74	18	**YES**	Maximum detect exceeds screening value.
N-Butylbenzene	9 / 199	0.0047	102	S20-2-15	0.0018	0.33	5100	No	Maximum detect below screening value.
N-Propylbenzene	14 / 199	0.00096	262	S20-2-15	0.0018	0.33	2100	No	Maximum detect below screening value.
o-Xylene	13 / 179	0.0015	0.533	DC-15-0.5	0.0018	0.33	300	No	Maximum detect below screening value.
Sec-Butylbenzene	9 / 199	0.0025	0.038	DC-9-0.5	0.0018	23.1	10000	No	Maximum detect below screening value.
Styrene	1 / 199	0.0011	0.0011	S2-1-0.5	0.0018	23.1	3600	No	Maximum detect below screening value.
Tert-Butylbenzene	7 / 199	0.0011	0.0319	DC-9-0.5	0.0018	23.1	10000	No	Maximum detect below screening value.
Tetrachloroethene	163 / 199	0.0009	848	S10-1-10	0.0027	23.1	41	**YES**	Maximum detect exceeds screening value.
Toluene	21 / 199	0.00072	0.156	DC-25-0.5	0.0018	23.1	4500	No	Maximum detect below screening value.
Total Xylenes	18 / 199	0.0019	313	S20-2-15	0.0027	0.67	270	**YES**	Maximum detect exceeds screening value.
Trans-1,2-Dichloroethene	77 / 199	0.00079	0.08	DC-3-0.5	0.0018	23.1	69	No	Maximum detect below screening value.
Trans-1,3-Dichloropropene	0 / 199	ND	ND	ND	0.0018	23.1	NA	No	Constituent not detected.
Trichloroethene	148 / 199	0.00067	29.3	S10-1-10	0.0027	**23.1**	2	**YES**	Maximum detect exceeds screening value.
Trichlorofluoromethane	0 / 199	ND	ND	ND	0.0018	23.1	340	No	Constituent not detected.
Vinyl Acetate	0 / 179	ND	ND	ND	0.0091	1.7	410	No	Constituent not detected.
Vinyl Chloride	8 / 199	0.0014	0.277	S1-2-2	0.0018	**23.1**	1.7	**YES**	Maximum detection limit exceeds screening value. [4]
Dibromochloropropane (DBCP)	0 / 179	ND	ND	ND	0.0018	0.33	NA	No	Constituent not detected.

TABLE 2-8
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
VOCs - Method 3810 Mod									
Benzene	0 / 118	ND	ND	ND	0.0084	0.0084	5.4	No	Constituent not detected.
Cis-1,2-Dichloroethene	61 / 118	0.009	6.185	DC-32-10	0.0084	0.0084	200	No	Maximum detect below screening value.
Ethylbenzene	0 / 118	ND	ND	ND	0.0084	0.0084	27	No	Constituent not detected.
Tetrachloroethene	81 / 118	0.0085	7.629	S11-4-15	0.0084	0.0084	41	No	Maximum detect below screening value.
Toluene	0 / 118	ND	ND	ND	0.0084	0.0084	4500	No	Constituent not detected.
Trichloroethene	57 / 118	0.0048	1.386	S11-4-15	0.0084	0.0084	2	No	Maximum detect below screening value.
Total Xylenes	0 / 118	ND	ND	ND	0.0084	0.0084	270	No	Constituent not detected.
Semi-Volatile Organics									
1,2,4-Trichlorobenzene	0 / 95	ND	ND	ND	0.0053	0.38	27	No	Constituent not detected.
1,2-Dichlorobenzene	0 / 95	ND	ND	ND	0.0053	0.38	980	No	Constituent not detected.
1,2-Diphenylhydrazine	0 / 95	ND	ND	ND	0.0053	0.38	2.2	No	Constituent not detected.
1,3-Dichlorobenzene	0 / 95	ND	ND	ND	0.0053	0.38	NA	No	Constituent not detected.
1,4-Dichlorobenzene	0 / 95	ND	ND	ND	0.0053	0.38	12	No	Constituent not detected.
1-Methylnaphthalene	3 / 95	0.030	0.182	DC-22-0.5	0.0053	0.38	53	No	Maximum detect below screening value.
2,4,5-Trichlorophenol	0 / 95	ND	ND	ND	0.0053	0.38	6200	No	Constituent not detected.
2,4,6-Trichlorophenol	0 / 95	ND	ND	ND	0.0053	0.38	62	No	Constituent not detected.
2,4-Dichlorophenol	0 / 95	ND	ND	ND	0.0053	0.38	180	No	Constituent not detected.
2,4-Dimethylphenol	1 / 95	0.035	0.035	S2-1-0.5	0.0053	0.38	1200	No	Maximum detect below screening value.
2,4-Dinitrophenol	0 / 95	ND	ND	ND	0.027	1.9	120	No	Constituent not detected.
2,4-Dinitrotoluene	0 / 95	ND	ND	ND	0.0053	0.38	5.5	No	Constituent not detected.
2,6-Dinitrotoluene	0 / 95	ND	ND	ND	0.0053	0.38	1.2	No	Constituent not detected.
2-Chloronaphthalene	0 / 95	ND	ND	ND	0.0053	0.38	8200	No	Constituent not detected.
2-Chlorophenol	0 / 95	ND	ND	ND	0.0053	0.38	510	No	Constituent not detected.
2-Methylnaphthalene	6 / 95	0.025	0.21	DC-22-0.5	0.0053	0.38	220	No	Maximum detect below screening value.
2-Methylphenol	1 / 95	0.027	0.027	S2-1-0.5	0.0053	0.38	3100	No	Maximum detect below screening value.
2-Nitroaniline	0 / 95	ND	ND	ND	0.0053	0.38	600	No	Constituent not detected.
2-Nitrophenol	0 / 95	ND	ND	ND	0.0053	0.38	NA	No	Constituent not detected.
3,3'-Dichlorobenzidine	0 / 95	ND	ND	ND	0.0053	0.38	3.8	No	Constituent not detected.
3-Nitroaniline	0 / 95	ND	ND	ND	0.0053	0.38	NA	No	Constituent not detected.
4,6-Dinitro-2-methylphenol	0 / 95	ND	ND	ND	0.011	0.76	4.9	No	Constituent not detected.
4-Bromophenyl phenyl ether	0 / 95	ND	ND	ND	0.0053	0.38	NA	No	Constituent not detected.
4-Chloro-3-Methylphenol	0 / 95	ND	ND	ND	0.0053	0.38	6200	No	Constituent not detected.
4-Chloroaniline	0 / 95	ND	ND	ND	0.0053	0.38	8.6	No	Constituent not detected.
4-Chlorophenyl phenyl ether	0 / 95	ND	ND	ND	0.0053	0.38	NA	No	Constituent not detected.
4-Nitroaniline	0 / 95	ND	ND	ND	0.0053	0.38	86	No	Constituent not detected.
4-Nitrophenol	0 / 95	ND	ND	ND	0.027	1.9	NA	No	Constituent not detected.
Acenaphthene	1 / 95	0.044	0.044	BC-2-0.5	0.0053	0.38	3300	No	Maximum detect below screening value.

TABLE 2-8
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
Acenaphthylene [5]	1 / 95	0.058	0.058	BC-2-0.5	0.0053	0.38	3300	No	Maximum detect below screening value.
Aniline	2 / 95	2.16	2.68	DC-23-0.5	0.0053	0.38	300	No	Maximum detect below screening value.
Anthracene	2 / 95	0.028	0.130	BC-2-0.5	0.0053	0.38	17000	No	Maximum detect below screening value.
Benzidine	0 / 95	ND	ND	ND	**0.053**	**3.8**	0.0075	No	Constituent not detected.
Benzo(a)anthracene	11 / 95	0.021	0.273	BC-2-0.5	0.0053	0.38	2.1	No	Maximum detect below screening value.
Benzo(a)pyrene	8 / 95	0.021	0.234	BC-2-0.5	0.0053	**0.38**	0.21	**YES**	Maximum detect exceeds screening value.
Benzo(b)fluoranthene	14 / 95	0.023	0.326	BC-2-0.5	0.0053	0.38	2.1	No	Maximum detect below screening value.
Benzo(g,h,i)perylene [6]	9 / 95	0.021	0.13	BC-2-0.5	0.0053	0.38	1700	No	Maximum detect below screening value.
Benzo(k)fluoranthene	5 / 95	0.027	0.137	BC-2-0.5	0.0053	0.38	21	No	Maximum detect below screening value.
Benzoic Acid	0 / 95	ND	ND	ND	0.027	1.9	250000	No	Constituent not detected.
Benzyl Alcohol	0 / 95	ND	ND	ND	0.0053	0.38	6200	No	Constituent not detected.
Bis(2-Chloroethoxy)methane	0 / 95	ND	ND	ND	0.0053	0.38	180	No	Constituent not detected.
Bis(2-Chloroethyl)ether	0 / 95	ND	ND	ND	0.0053	0.38	1	No	Constituent not detected.
Bis(2-Chloroisopropyl)ether	0 / 95	ND	ND	ND	0.0053	0.38	22	No	Constituent not detected.
Bis(2-Ethylhexyl) phthalate	11 / 95	0.040	2.01	S2-1-0.5	0.011	0.76	120	No	Maximum detect below screening value.
Butyl benzyl phthalate	3 / 95	0.061	0.344	S2-1-0.5	0.0053	0.38	910	No	Maximum detect below screening value.
Carbazole [7]	1 / 95	0.051	0.051	BC-2-0.5	0.0053	0.38	NA	No	Screening value not available.
Chrysene	20 / 95	0.018	0.314	BC-2-0.5	0.0053	0.38	210	No	Maximum detect below screening value.
Dibenz(a,h)anthracene	1 / 95	0.038	0.038	BC-2-0.5	0.0053	**0.38**	0.21	No	Maximum detect below screening value.
Dibenzofuran	2 / 95	0.042	0.063	DC-22-0.5	0.0053	0.38	100	No	Maximum detect below screening value.
Diethyl Phthalate	0 / 95	ND	ND	ND	0.011	0.76	49000	No	Constituent not detected.
Dimethyl Phthalate	0 / 95	ND	ND	ND	0.0053	0.38	NA	No	Constituent not detected.
Di-N-butyl phthalate	9 / 95	0.041	6.17	BC-3-0.5	0.011	0.5	6200	No	Maximum detect below screening value.
Di-N-octyl phthalate	0 / 95	ND	ND	ND	0.0053	0.38	620	No	Constituent not detected.
Fluoranthene	23 / 95	0.021	0.473	BC-2-0.5	0.0053	0.38	2200	No	Maximum detect below screening value.
Fluorene	1 / 95	0.056	0.056	BC-2-0.5	0.0053	0.38	2200	No	Maximum detect below screening value.
Hexachloro-1,3-cyclopentadiene	0 / 95	ND	ND	ND	0.0053	0.38	370	No	Constituent not detected.
Hexachlorobenzene	0 / 95	ND	ND	ND	0.0053	0.38	1.1	No	Constituent not detected.
Hexachlorobutadiene	0 / 95	ND	ND	ND	0.0053	0.38	22	No	Constituent not detected.
Hexachloroethane	0 / 95	ND	ND	ND	0.0053	0.38	43	No	Constituent not detected.
Indeno(1,2,3-cd)pyrene	7 / 95	0.023	0.137	BC-2-0.5	0.0053	0.38	2.1	No	Maximum detect below screening value.
Isophorone	7 / 95	0.030	10	DC-15-0.5	0.0053	0.38	1800	No	Maximum detect below screening value.
m-,p-Cresol mixture [8]	1 / 95	0.045	0.045	S2-1-0.5	0.0053	0.38	3100	No	Maximum detect below screening value.
Naphthalene	4 / 95	0.023	0.090	DC-22-0.5	0.0053	0.38	18	No	Maximum detect below screening value.
Nitrobenzene	0 / 95	ND	ND	ND	0.0053	0.38	24	No	Constituent not detected.
N-Nitrosodimethylamine	0 / 95	ND	ND	ND	0.011	**0.76**	0.034	No	Constituent not detected.
N-Nitrosodi-N-propylamine	0 / 95	ND	ND	ND	0.0053	**0.38**	0.25	No	Constituent not detected.

TABLE 2-8
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
N-Nitrosodiphenylamine	1 / 95	0.099	0.099	DC-23-2	0.0053	0.38	350	No	Maximum detect below screening value.
Pentachlorophenol	0 / 95	ND	ND	ND	0.027	1.9	2.7	No	Constituent not detected.
Phenanthrene [9]	24 / 95	0.021	0.501	BC-2-0.5	0.0053	0.38	17000	No	Maximum detect below screening value.
Phenol	2 / 95	0.176	0.198	S2-1-0.5	0.0053	0.38	18000	No	Maximum detect below screening value.
Pyrene	23 / 95	0.0191	0.455	BC-2-0.5	0.0053	0.38	1700	No	Maximum detect below screening value.
Pyridine	0 / 95	ND	ND	ND	0.011	0.76	100	No	Constituent not detected.
PCBs									
Aroclor-1016	0 / 38	ND	ND	ND	0.016	1.9	3.7	No	Constituent not detected.
Aroclor-1221	0 / 38	ND	ND	ND	0.016	**1.9**	0.54	No	Constituent not detected.
Aroclor-1232	0 / 38	ND	ND	ND	0.016	**1.9**	0.54	No	Constituent not detected.
Aroclor-1242	0 / 38	ND	ND	ND	0.016	**1.9**	0.74	No	Constituent not detected.
Aroclor-1248	0 / 38	ND	ND	ND	0.016	**1.9**	0.74	No	Constituent not detected.
Aroclor-1254	1 / 38	0.014	0.014	BC-2-2	0.016	**1.9**	0.74	No	Maximum detect below screening value.
Aroclor-1260	0 / 38	ND	ND	ND	0.016	**1.9**	0.74	No	Constituent not detected.
Total Petroleum Hydrocarbons (TPH)									
DRO (C10-C28) Range	30 / 78	3.88	807	S2-1-0.5	8.2	11	NA	No	Evaluated through individual constituents including BTEX and naphthalene.
Herbicides/Pesticides									
2,4,5-T	2 / 67	0.027	0.0304	DC-24-2	0.032	0.21	620	No	Maximum detect below screening value.
2,4-D	0 / 67	ND	ND	ND	0.32	2.1	770	No	Constituent not detected.
2,4-Db	0 / 67	ND	ND	ND	0.32	2.1	490	No	Constituent not detected.
4,4'-DDD	1 / 67	0.00069	0.00069	DC-9-0.5	0.0033	0.076	7.2	No	Maximum detect below screening value.
4,4'-DDE	1 / 67	0.0046	0.0046	DC-22-0.5	0.0033	0.076	5.1	No	Maximum detect below screening value.
4,4'-DDT	3 / 67	0.001	0.0028	BC-4-2	0.0033	0.076	7	No	Maximum detect below screening value.
Aldrin	0 / 67	ND	ND	ND	0.0017	0.038	0.1	No	Constituent not detected.
Alpha-BHC	0 / 67	ND	ND	ND	0.0017	0.038	0.27	No	Constituent not detected.
Beta-BHC	0 / 67	ND	ND	ND	0.0017	0.038	0.96	No	Constituent not detected.
Delta-BHC	0 / 48	ND	ND	ND	0.0017	0.038	NA	No	Constituent not detected.
Alpha-Chlordane [10]	2 / 67	0.0013	0.027	BC-3-0.5	0.0017	0.019	6.5	No	Maximum detect below screening value.
Dalapon	0 / 67	ND	ND	ND	1.6	10	1800	No	Constituent not detected.
Dicamba	0 / 67	ND	ND	ND	0.032	0.21	1800	No	Constituent not detected.
Dichoroprop	0 / 67	ND	ND	ND	0.32	2.1	NA	No	Constituent not detected.
Dieldrin	1 / 67	0.00051	0.00051	DC-SUMP-0.5	0.0017	0.038	0.11	No	Maximum detect below screening value.
Dinoseb	0 / 67	ND	ND	ND	0.79	5.1	62	No	Constituent not detected.
Endosulfan I [11]	0 / 67	ND	ND	ND	0.0017	0.038	370	No	Constituent not detected.
Endosulfan II [11]	0 / 67	ND	ND	ND	0.0017	0.038	370	No	Constituent not detected.
Endosulfan sulfate [11]	1 / 67	0.0027	0.0027	BC-4-2	0.0033	0.076	370	No	Maximum detect below screening value.
Endrin	0 / 67	ND	ND	ND	0.0033	0.076	18	No	Constituent not detected.

TABLE 2-8
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Herbicides/Pesticides (continued)									
Endrin aldehyde [12]	1 / 67	0.0013	0.0013	BC-4-2	0.0033	0.076	18	No	Maximum detect below screening value.
Endrin ketone [12]	2 / 67	0.0018	0.0315	DC-22-0.5	0.0033	0.076	18	No	Maximum detect below screening value.
Gamma-BHC	0 / 67	ND	ND	ND	0.0017	0.038	2.1	No	Constituent not detected.
Gamma-Chlordane [10]	2 / 67	0.0017	0.047	BC-3-0.5	0.0017	0.019	6.5	No	Maximum detect below screening value.
Heptachlor	0 / 67	ND	ND	ND	0.0017	0.038	0.38	No	Constituent not detected.
Heptachlor epoxide	1 / 67	0.0191	0.0191	BC-3-0.5	0.0017	0.019	0.19	No	Maximum detect below screening value.
Mcpa	0 / 67	ND	ND	ND	**32**	**210**	31	No	Constituent not detected.
Mcpp	2 / 67	26.5	93.5	DC-24-2	32	**210**	62	**YES**	Maximum detect exceeds screening value.
Methoxychlor	2 / 67	0.0093	0.094	DC-SUMP-0.5	0.0033	0.076	310	No	Maximum detect below screening value.
Pentachlorophenol	4 / 67	0.0089	0.057	BC-3-0.5	0.032	0.21	2.7	No	Maximum detect below screening value.
Silvex (2,4,5-TP)	0 / 67	ND	ND	ND	0.032	0.21	490	No	Constituent not detected.
Toxaphene	1 / 67	2.15	2.15	BC-3-0.5	0.083	0.96	1.6	**YES**	Maximum detect exceeds screening value.
Total Metals									
Aluminum	65 / 65	6280	23500	DC-22-2	--	--	99000	No	Maximum detect below screening value.
Antimony	0 / 69	ND	ND	ND	0.87	6.1	41	No	Constituent not detected.
Arsenic	92 / 97	0.56	176	S1-2-2	1.1	**41**	2.4	**YES**	Maximum detect exceeds screening value.
Barium	95 / 95	10.9	480	DC-19-0.5	--	--	19000	No	Maximum detect below screening value.
Beryllium	7 / 69	0.26	1.3	DC-21-2	0.11	1.5	200	No	Maximum detect below screening value.
Boron	7 / 22	10.3	11.7	DC-2-0.5	9.2	11	20000	No	Maximum detect below screening value.
Cadmium	8 / 97	0.29	8.7	S2-1-0.5	0.17	1.2	80	No	Maximum detect below screening value.
Calcium	68 / 68	258	29100	DC-13-0.5	--	--	NA	No	Essential Nutrient.
Chromium [13]	97 / 97	0.61	252	S2-1-0.5	--	--	128572	No	Maximum detect below screening value.
Cobalt	7 / 69	1.1	20.1	DC-13-0.5	9	15	30	No	Maximum detect below screening value.
Copper	69 / 69	1.2	44.6	DC-20-0.5	--	--	4100	No	Maximum detect below screening value.
Iron	68 / 68	1910	49500	DC-22-0.5	--	--	72000	No	Maximum detect below screening value.
Lead	96 / 97	1.2	813	S2-1-0.5	4.1	4.1	800	**YES**	Maximum detect exceeds screening value.
Lithium	0 / 22	ND	ND	ND	**460**	**540**	200	No	Constituent not detected.
Manganese	68 / 68	19.1	1390	DC-20-0.5	--	--	2300	No	Maximum detect below screening value.
Magnesium	66 / 68	640	5660	BC-1-2	220	950	NA	No	Essential Nutrient.
Mercury	13 / 95	0.044	2	S3-1-0.5	0.037	0.054	4.3	No	Maximum detect below screening value.
Molybdenum	0 / 69	ND	ND	ND	1.7	15	510	No	Constituent not detected.
Nickel	69 / 69	1.7	41.7	DC-22-0.5	--	--	2000	No	Maximum detect below screening value.
Potassium	56 / 68	1580	4350	DC-14-0.5	430	3000	NA	No	Essential Nutrient.
Selenium	2 / 97	1.1	5.8	DC-22-0.5	0.83	6.1	510	No	Maximum detect below screening value.
Silver	0 / 97	ND	ND	ND	0.41	3.1	510	No	Constituent not detected.
Sodium	0 / 68	ND	ND	ND	430	3100	NA	No	Constituent not detected.

TABLE 2-8
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Total Metals (continued)									
Strontium (Total)	65 / 65	36.7	128	DC-13-0.5	--	--	61000	No	Maximum detect below screening value.
Thallium	0 / 69	ND	ND	ND	0.49	**3.1**	1	No	Constituent not detected.
Tin	1 / 65	13	13	BC-4-0.5	2.4	15	61000	No	Maximum detect below screening value.
Titanium [14]	65 / 65	58	239	DC-22-0.5	--	--	60000	No	Maximum detect below screening value.
Vanadium	69 / 69	3.5	39.6	BC-1-2	--	--	510	No	Maximum detect below screening value.
Zinc	68 / 69	21.3	472	DC-19-0.5	10.8	10.8	31000	No	Maximum detect below screening value.

Notes:
ND - Not Detected
NA - Not Available
"- -" - Constituent detected in every sample; detection limit not presented.
[1] Regional Screening Levels (RSLs) for industrial direct contact from USEPA (2013a). Non-cancer based screening levels reflect a hazard quotient of 0.1.
[2] The RSL for 4-isopropyltoluene is based on the RSL for isopropylbenzene.
[3] The RSL for m,p-xylenes is conservatively based on the RSL for m-xylene.
[4] Vinyl chloride is retained as a COI because the detection limit exceeded the RSL, and vinyl chloride is a COI for direct contact in other onsite areas.
[5] The RSL for acenapthylene is based on the RSL for acenapthene.
[6] The RSL for benzo(g,h,i)perylene is based on the RSL for pyrene.
[7] No screening value is available for this constituent; and no toxicity values are available for quantitative evaluation.
[8] The RSL for m,p-cresol is conservatively based on the RSL for m-cresol.
[9] The RSL for phenanthrene is based on the RSL for anthracene.
[10] The RSLs for alpha- and gamma-chlordane are based on the RSL for chlordane.
[11] The RSLs for endosulfan I, endosulfan II and endosulfan sulfate are based on the RSL for endosulfan.
[12] The RSLs for endrin aldehyde and endrin ketone are based on the RSL for endrin.
[13] Industrial soil RSL for total chromium is based on the assumption that hexavalent and trivalent chromium are present at a ratio of 1:6 (Cr IV to Cr III). See text Section 2.4.1.
[14] The RSL for titanium is based on the RSL for titanium tetrachloride.
Bold detection limits indicates the value exceeds the RSL.

TABLE 2-9
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Volatile Organics									
1,1,1,2-Tetrachloroethane	0 / 199	ND	ND	ND	0.0018	**23.1**	0.0046	No	Constituent not detected.
1,1,1-Trichloroethane	137 / 199	0.0015	10.4	S10-1-10	0.0027	**23.1**	6.27	**YES**	Maximum detect exceeds screening value.
1,1,2,2-Tetrachloroethane	0 / 199	ND	ND	ND	**0.0018**	**23.1**	0.00063	No	Constituent not detected.
1,1,2-Trichloroethane	3 / 199	0.00085	0.0021	DC-3-2	**0.0018**	**23.1**	0.00031	**YES**	Maximum detect exceeds screening value.
1,1-Dichloroethane	116 / 199	0.00058	0.494	DC-3-0.5	0.0025	**23.1**	0.016	**YES**	Maximum detect exceeds screening value.
1,1-Dichloroethene	98 / 199	0.00105	0.223	S10-1-10	0.0025	**23.1**	0.22	No	Maximum detect below screening value.
1,1-Dichloropropene	0 / 199	ND	ND	ND	0.0018	23.1	NA	No	Constituent not detected.
1,2,3-Trichlorobenzene	0 / 199	ND	ND	ND	0.0018	**23.1**	0.036	No	Constituent not detected.
1,2,3-Trichloropropane	0 / 199	ND	ND	ND	**0.0018**	**23.1**	0.0000067	No	Constituent not detected.
1,2,4-Trichlorobenzene	0 / 199	ND	ND	ND	0.0018	**23.1**	0.027	No	Constituent not detected.
1,2,4-Trimethylbenzene	10 / 199	0.001	1230	S20-2-15	0.0018	**0.33**	0.051	**YES**	Maximum detect exceeds screening value.
1,2-Dibromoethane	0 / 199	ND	ND	ND	**0.0018**	**23.1**	0.000043	No	Constituent not detected.
1,2-Dichlorobenzene	0 / 199	ND	ND	ND	0.0018	**23.1**	0.65	No	Constituent not detected.
1,2-Dichloroethane	0 / 199	ND	ND	ND	**0.0018**	**23.1**	0.001	No	Constituent not detected.
1,2-Dichloroethene, Total	6 / 20	0.0039	0.262	DC-30-10	0.0027	**23.1**	0.089	**YES**	Maximum detect exceeds screening value.
1,2-Dichloropropane	0 / 199	ND	ND	ND	0.0018	**23.1**	0.0031	No	Constituent not detected.
1,3,5-Trimethylbenzene	9 / 199	0.00067	330	S20-2-15	0.0018	**0.33**	0.29	**YES**	Maximum detect exceeds screening value.
1,3-Dichlorobenzene	0 / 199	ND	ND	ND	0.0018	23.1	NA	No	Constituent not detected.
1,3-Dichloropropane	0 / 199	ND	ND	ND	0.0018	**23.1**	0.24	No	Constituent not detected.
1,4-Dichlorobenzene	0 / 199	ND	ND	ND	0.0018	**23.1**	0.0096	No	Constituent not detected.
1,4-Dioxane	24 / 179	0.056	13.0	DC-6-0.5	**0.073**	**13**	0.0034	**YES**	Maximum detect exceeds screening value.
2,2-Dichloropropane	0 / 199	ND	ND	ND	0.0018	23.1	NA	No	Constituent not detected.
2-Butanone	16 / 199	0.006	0.215	S2-1-0.5	0.0054	**46.2**	2.41	No	Maximum detect below screening value.
2-Chloroethyl vinyl ether	0 / 159	ND	ND	ND	0.0091	1.7	NA	No	Constituent not detected.
2-Chlorotoluene	0 / 199	ND	ND	ND	0.0018	**23.1**	0.41	No	Constituent not detected.
2-Hexanone (methyl butyl ketone)	0 / 199	ND	ND	ND	0.0091	**92.4**	0.019	No	Constituent not detected.
3-Chloro-1,2-dibromopropane	0 / 20	ND	ND	ND	**0.0054**	**46.2**	0.0000034	No	Constituent not detected.
4-Chlorotoluene	0 / 199	ND	ND	ND	0.0018	**23.1**	0.43	No	Constituent not detected.
4-Isopropyltoluene [2]	4 / 199	0.0024	27.4	S20-2-15	0.0018	**1.87**	1.54	**YES**	Maximum detect exceeds screening value.
4-Methyl-2-pentanone	2 / 199	0.0054	0.02	S2-1-0.5	0.0054	**46.2**	0.55	No	Maximum detect below screening value.
Acetone	56 / 199	0.012	0.249	S4-2-0.5	0.0108	**92.4**	5.78	No	Maximum detect below screening value.
Acrolein	0 / 179	ND	ND	ND	**0.0091**	**1.7**	0.00002	No	Constituent not detected.
Acrylonitrile	0 / 179	ND	ND	ND	**0.0091**	**1.7**	0.00024	No	Constituent not detected.
Benzene	19 / 199	0.00063	0.0046	DC-9-0.5	0.0018	**23.1**	0.0048	No	Maximum detect below screening value.
Bromobenzene	0 / 199	ND	ND	ND	0.0018	**23.1**	0.087	No	Constituent not detected.
Bromochloromethane	0 / 199	ND	ND	ND	0.0018	**23.1**	0.051	No	Constituent not detected.
Bromodichloromethane	0 / 199	ND	ND	ND	**0.0018**	**23.1**	0.00077	No	Constituent not detected.

TABLE 2-9
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Volatile Organics (continued)									
Bromoform	0 / 199	ND	ND	ND	0.0018	**23.1**	0.051	No	Constituent not detected.
Bromomethane	0 / 199	ND	ND	ND	0.0018	**23.1**	0.0043	No	Constituent not detected.
Carbon Disulfide	10 / 197	0.0019	0.006	DC-20-0.5	0.0018	**23.1**	0.51	No	Maximum detect below screening value.
Carbon Tetrachloride	2 / 199	0.00094	0.00099	S1-1-10	0.0018	**23.1**	0.0036	No	Maximum detect below screening value.
Chlorobenzene	1 / 199	0.0012	0.0012	S20-1-INT	0.0018	**23.1**	0.12	No	Maximum detect below screening value.
Dibromochloromethane	0 / 199	ND	ND	ND	**0.0018**	**23.1**	0.00094	No	Constituent not detected.
Chloroethane	5 / 199	0.0026	0.032	DC-9-0.5	0.0018	**23.1**	14.2	No	Maximum detect below screening value.
Chloroform	28 / 199	0.00066	0.0039	DC-3-0.5	**0.0018**	**23.1**	0.0013	**YES**	Maximum detect exceeds screening value.
Chloromethane	0 / 199	ND	ND	ND	0.0018	**23.1**	0.12	No	Constituent not detected.
Cis-1,2-Dichloroethene	141 / 199	0.00083	52.1	DC-3-0.5	0.0025	**23.1**	0.020	**YES**	Maximum detect exceeds screening value.
Cis-1,3-Dichloropropene	0 / 199	ND	ND	ND	0.0018	23.1	NA	No	Constituent not detected.
Dibromomethane	0 / 199	ND	ND	ND	0.0018	**23.1**	0.0046	No	Constituent not detected.
Dichlorodifluoromethane	0 / 199	ND	ND	ND	0.0018	**23.1**	0.72	No	Constituent not detected.
Ethylbenzene	15 / 199	0.00091	98.7	S20-2-15	0.0018	**0.33**	0.036	**YES**	Maximum detect exceeds screening value.
Hexachlorobutadiene	0 / 199	ND	ND	ND	0.0018	**23.1**	0.012	No	Constituent not detected.
Isopropylbenzene	10 / 199	0.0025	46.4	S20-2-15	0.0018	**1.87**	1.54	**YES**	Maximum detect exceeds screening value.
m,p-Xylenes [3]	14 / 179	0.0019	1.34	DC-15-0.5	0.0036	**0.67**	0.43	**YES**	Maximum detect exceeds screening value.
Methyl tert-butyl ether	5 / 195	0.0006	0.0024	S1-2-2	0.0018	**23.1**	0.067	No	Maximum detect below screening value.
Methylene chloride	5 / 199	0.0026	0.13	S10-1-INT	0.0027	**23.1**	0.053	**YES**	Maximum detect exceeds screening value.
Naphthalene	7 / 199	0.0037	179	S20-2-15	0.0018	**3.74**	0.011	**YES**	Maximum detect exceeds screening value.
N-Butylbenzene	9 / 199	0.0047	102	S20-2-15	0.0018	0.33	6.025	**YES**	Maximum detect exceeds screening value.
N-Propylbenzene	14 / 199	0.00096	262	S20-2-15	0.0018	0.33	2.39	**YES**	Maximum detect exceeds screening value.
o-Xylene	13 / 179	0.0015	0.533	DC-15-0.5	0.0018	0.33	0.46	**YES**	Maximum detect exceeds screening value.
Sec-Butylbenzene	9 / 199	0.0025	0.038	DC-9-0.5	0.0018	**23.1**	11.1	No	Maximum detect below screening value.
Styrene	1 / 199	0.0011	0.0011	S2-1-0.5	0.0018	**23.1**	2.89	No	Maximum detect below screening value.
Tert-Butylbenzene	7 / 199	0.0011	0.0319	DC-9-0.5	0.0018	**23.1**	2.65	No	Maximum detect below screening value.
Tetrachloroethene	163 / 199	0.0009	848	S10-1-10	0.0027	**23.1**	0.039	**YES**	Maximum detect exceeds screening value.
Toluene	21 / 199	0.00072	0.156	DC-25-0.5	0.0018	**23.1**	1.42	No	Maximum detect below screening value.
Total Xylenes	18 / 199	0.0019	313	S20-2-15	0.0027	**0.67**	0.46	**YES**	Maximum detect exceeds screening value.
Trans-1,2-Dichloroethene	77 / 199	0.00079	0.08	DC-3-0.5	0.0018	**23.1**	0.060	**YES**	Maximum detect exceeds screening value.
Trans-1,3-Dichloropropene	0 / 199	ND	ND	ND	0.0018	23.1	NA	No	Constituent not detected.
Trichloroethene	148 / 199	0.00067	29.3	S10-1-10	**0.0027**	**23.1**	0.0022	**YES**	Maximum detect exceeds screening value.
Trichlorofluoromethane	0 / 199	ND	ND	ND	0.0018	**23.1**	1.66	No	Constituent not detected.
Vinyl Acetate	0 / 179	ND	ND	ND	0.0091	**1.7**	0.21	No	Constituent not detected.
Vinyl Chloride	8 / 199	0.0014	0.277	S1-2-2	**0.0018**	**23.1**	0.00013	**YES**	Maximum detect exceeds screening value.
Dibromochloropropane (DBCP)	0 / 179	ND	ND	ND	0.0018	0.33	NA	No	Constituent not detected.

TABLE 2-9
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
VOCs - Method 3810 Mod									
Benzene	0 / 118	ND	ND	ND	**0.0084**	**0.0084**	0.0048	No	Constituent not detected.
Cis-1,2-Dichloroethene	61 / 118	0.009	6.185	DC-32-10	0.0084	0.0084	0.02	**YES**	Maximum detect exceeds screening value.
Ethylbenzene	0 / 118	ND	ND	ND	0.0084	0.0084	0.036	No	Constituent not detected.
Tetrachloroethene	81 / 118	0.0085	7.629	S11-4-15	0.0084	0.0084	0.039	**YES**	Maximum detect exceeds screening value.
Toluene	0 / 118	ND	ND	ND	0.0084	0.0084	1.42	No	Constituent not detected.
Trichloroethene	57 / 118	0.0048	1.386	S11-4-15	**0.0084**	**0.0084**	0.0022	**YES**	Maximum detect exceeds screening value.
Total Xylenes	0 / 118	ND	ND	ND	0.0084	0.0084	0.46	No	Constituent not detected.
Semi-Volatile Organics									
1,2,4-Trichlorobenzene	0 / 95	ND	ND	ND	0.0053	**0.38**	0.027	No	Constituent not detected.
1,2-Dichlorobenzene	0 / 95	ND	ND	ND	0.0053	0.38	0.65	No	Constituent not detected.
1,2-Diphenylhydrazine	0 / 95	ND	ND	ND	0.0053	**0.38**	0.0053	No	Constituent not detected.
1,3-Dichlorobenzene	0 / 95	ND	ND	ND	0.0053	0.38	NA	No	Constituent not detected.
1,4-Dichlorobenzene	0 / 95	ND	ND	ND	0.0053	**0.38**	0.0096	No	Constituent not detected.
1-Methylnaphthalene	3 / 95	0.030	0.182	DC-22-0.5	0.0053	**0.38**	0.12	**YES**	Maximum detect exceeds screening value.
2,4,5-Trichlorophenol	0 / 95	ND	ND	ND	0.0053	0.38	7.95	No	Constituent not detected.
2,4,6-Trichlorophenol	0 / 95	ND	ND	ND	0.0053	**0.38**	0.082	No	Constituent not detected.
2,4-Dichlorophenol	0 / 95	ND	ND	ND	0.0053	**0.38**	0.099	No	Constituent not detected.
2,4-Dimethylphenol	1 / 95	0.035	0.035	S2-1-0.5	0.0053	0.38	0.77	No	Maximum detect below screening value.
2,4-Dinitrophenol	0 / 95	ND	ND	ND	0.027	**1.9**	0.082	No	Constituent not detected.
2,4-Dinitrotoluene	0 / 95	ND	ND	ND	0.0053	**0.38**	0.0067	No	Constituent not detected.
2,6-Dinitrotoluene	0 / 95	ND	ND	ND	**0.0053**	**0.38**	0.0014	No	Constituent not detected.
2-Chloronaphthalene	0 / 95	ND	ND	ND	0.0053	0.38	6.99	No	Constituent not detected.
2-Chlorophenol	0 / 95	ND	ND	ND	0.0053	**0.38**	0.14	No	Constituent not detected.
2-Methylnaphthalene	6 / 95	0.025	0.21	DC-22-0.5	0.0053	**0.38**	0.34	No	Maximum detect below screening value.
2-Methylphenol	1 / 95	0.027	0.027	S2-1-0.5	0.0053	0.38	1.40	No	Maximum detect below screening value.
2-Nitroaniline	0 / 95	ND	ND	ND	0.0053	**0.38**	0.15	No	Constituent not detected.
2-Nitrophenol	0 / 95	ND	ND	ND	0.0053	0.38	NA	No	Constituent not detected.
3,3'-Dichlorobenzidine	0 / 95	ND	ND	ND	0.0053	**0.38**	0.017	No	Constituent not detected.
3-Nitroaniline	0 / 95	ND	ND	ND	0.0053	0.38	NA	No	Constituent not detected.
4,6-Dinitro-2-methylphenol	0 / 95	ND	ND	ND	**0.011**	**0.76**	0.0048	No	Constituent not detected.
4-Bromophenyl phenyl ether	0 / 95	ND	ND	ND	0.0053	0.38	NA	No	Constituent not detected.
4-Chloro-3-Methylphenol	0 / 95	ND	ND	ND	0.0053	0.38	3.13	No	Constituent not detected.
4-Chloroaniline	0 / 95	ND	ND	ND	**0.0053**	**0.38**	0.0031	No	Constituent not detected.
4-Chlorophenyl phenyl ether	0 / 95	ND	ND	ND	0.0053	0.38	NA	No	Constituent not detected.
4-Nitroaniline	0 / 95	ND	ND	ND	0.0053	**0.38**	0.034	No	Constituent not detected.
4-Nitrophenol	0 / 95	ND	ND	ND	0.027	1.9	NA	No	Constituent not detected.
Acenaphthene	1 / 95	0.044	0.044	BC-2-0.5	0.0053	0.38	9.88	No	Maximum detect below screening value.

TABLE 2-9
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
Acenaphthylene [4]	1 / 95	0.058	0.058	BC-2-0.5	0.0053	0.38	9.881	No	Maximum detect below screening value.
Aniline	2 / 95	2.16	2.68	DC-23-0.5	0.0053	**0.38**	0.089	**YES**	Maximum detect exceeds screening value.
Anthracene	2 / 95	0.028	0.130	BC-2-0.5	0.0053	0.38	101	No	Maximum detect below screening value.
Benzidine	0 / 95	ND	ND	ND	**0.053**	**3.8**	0.0000058	No	Constituent not detected.
Benzo(a)anthracene	11 / 95	0.021	0.273	BC-2-0.5	0.0053	**0.38**	0.24	**YES**	Maximum detect exceeds screening value.
Benzo(a)pyrene	8 / 95	0.021	0.234	BC-2-0.5	0.0053	**0.38**	0.084	**YES**	Maximum detect exceeds screening value.
Benzo(b)fluoranthene	14 / 95	0.023	0.326	BC-2-0.5	0.0053	0.38	0.84	No	Maximum detect below screening value.
Benzo(g,h,i)perylene [5]	9 / 95	0.021	0.13	BC-2-0.5	0.0053	0.38	22.9	No	Maximum detect below screening value.
Benzo(k)fluoranthene	5 / 95	0.027	0.137	BC-2-0.5	0.0053	0.38	8.44	No	Maximum detect below screening value.
Benzoic Acid	0 / 95	ND	ND	ND	0.027	1.9	33.7	No	Constituent not detected.
Benzyl Alcohol	0 / 95	ND	ND	ND	0.0053	0.38	0.89	No	Constituent not detected.
Bis(2-Chloroethoxy)methane	0 / 95	ND	ND	ND	0.0053	**0.38**	0.027	No	Constituent not detected.
Bis(2-Chloroethyl)ether	0 / 95	ND	ND	ND	**0.0053**	**0.38**	0.000075	No	Constituent not detected.
Bis(2-Chloroisopropyl)ether	0 / 95	ND	ND	ND	**0.0053**	**0.38**	0.0027	No	Constituent not detected.
Bis(2-Ethylhexyl) phthalate	11 / 95	0.040	2.01	S2-1-0.5	0.011	0.76	26.5	No	Maximum detect below screening value.
Butyl benzyl phthalate	3 / 95	0.061	0.344	S2-1-0.5	0.0053	0.38	4.82	No	Maximum detect below screening value.
Carbazole	1 / 95	0.051	0.051	BC-2-0.5	0.0053	0.38	NA	No	Screening value not available.
Chrysene	20 / 95	0.018	0.314	BC-2-0.5	0.0053	0.38	26.5	No	Maximum detect below screening value.
Dibenz(a,h)anthracene	1 / 95	0.038	0.038	BC-2-0.5	0.0053	**0.38**	0.27	No	Maximum detect below screening value.
Dibenzofuran	2 / 95	0.042	0.063	DC-22-0.5	0.0053	**0.38**	0.27	No	Maximum detect below screening value.
Diethyl Phthalate	0 / 95	ND	ND	ND	0.011	0.76	11.3	No	Constituent not detected.
Dimethyl Phthalate	0 / 95	ND	ND	ND	0.0053	0.38	NA	No	Constituent not detected.
Di-N-butyl phthalate	9 / 95	0.041	6.17	BC-3-0.5	0.011	0.5	4.097	**YES**	Maximum detect exceeds screening value.
Di-N-octyl phthalate	0 / 95	ND	ND	ND	0.0053	0.38	106	No	Constituent not detected.
Fluoranthene	23 / 95	0.021	0.473	BC-2-0.5	0.0053	0.38	169	No	Maximum detect below screening value.
Fluorene	1 / 95	0.056	0.056	BC-2-0.5	0.0053	0.38	9.64	No	Maximum detect below screening value.
Hexachloro-1,3-cyclopentadiene	0 / 95	ND	ND	ND	0.0053	**0.38**	0.17	No	Constituent not detected.
Hexachlorobenzene	0 / 95	ND	ND	ND	0.0053	**0.38**	0.013	No	Constituent not detected.
Hexachlorobutadiene	0 / 95	ND	ND	ND	0.0053	**0.38**	0.012	No	Constituent not detected.
Hexachloroethane	0 / 95	ND	ND	ND	0.0053	**0.38**	0.0075	No	Constituent not detected.
Indeno(1,2,3-cd)pyrene	7 / 95	0.023	0.137	BC-2-0.5	0.0053	0.38	4.82	No	Maximum detect below screening value.
Isophorone	7 / 95	0.030	10	DC-15-0.5	0.0053	0.38	0.53	**YES**	Maximum detect exceeds screening value.
m-,p-Cresol mixture [6]	1 / 95	0.045	0.045	S2-1-0.5	0.0053	0.38	1.37	No	Maximum detect below screening value.
Naphthalene	4 / 95	0.023	0.090	DC-22-0.5	0.0053	**0.38**	0.011	**YES**	Maximum detect exceeds screening value.
Nitrobenzene	0 / 95	ND	ND	ND	**0.0053**	**0.38**	0.0019	No	Constituent not detected.
N-Nitrosodimethylamine	0 / 95	ND	ND	ND	**0.011**	**0.76**	0.0000024	No	Constituent not detected.
N-Nitrosodi-N-propylamine	0 / 95	ND	ND	ND	**0.0053**	**0.38**	0.00017	No	Constituent not detected.

TABLE 2-9
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
N-Nitrosodiphenylamine	1 / 95	0.099	0.099	DC-23-2	0.0053	0.38	1.37	No	Maximum detect below screening value.
Pentachlorophenol	0 / 95	ND	ND	ND	**0.027**	**1.9**	0.0087	No	Constituent not detected.
Phenanthrene [7]	24 / 95	0.021	0.501	BC-2-0.5	0.0053	0.38	101	No	Maximum detect below screening value.
Phenol	2 / 95	0.176	0.198	S2-1-0.5	0.0053	0.38	6.27	No	Maximum detect below screening value.
Pyrene	23 / 95	0.0191	0.455	BC-2-0.5	0.0053	0.38	22.9	No	Maximum detect below screening value.
Pyridine	0 / 95	ND	ND	ND	0.011	**0.76**	0.013	No	Constituent not detected.
PCBs									
Aroclor-1016	0 / 38	ND	ND	ND	0.016	**1.9**	0.24	No	Constituent not detected.
Aroclor-1221	0 / 38	ND	ND	ND	**0.016**	**1.9**	0.0017	No	Constituent not detected.
Aroclor-1232	0 / 38	ND	ND	ND	**0.016**	**1.9**	0.0017	No	Constituent not detected.
Aroclor-1242	0 / 38	ND	ND	ND	0.016	**1.9**	0.13	No	Constituent not detected.
Aroclor-1248	0 / 38	ND	ND	ND	0.016	**1.9**	0.13	No	Constituent not detected.
Aroclor-1254	1 / 38	0.014	0.014	BC-2-2	0.016	**1.9**	0.20	No	Maximum detect below screening value.
Aroclor-1260	0 / 38	ND	ND	ND	0.016	**1.9**	0.58	No	Constituent not detected.
Total Petroleum Hydrocarbons (TPH)									
DRO (C10-C28) Range	30 / 78	3.88	807	S2-1-0.5	8.2	11	NA	No	Evaluated through individual constituents including BTEX and naphthalene.
Herbicides/Pesticides									
2,4,5-T	2 / 67	0.027	0.0304	DC-24-2	0.032	**0.21**	0.13	No	Maximum detect below screening value.
2,4-D	0 / 67	ND	ND	ND	**0.32**	**2.1**	0.084	No	Constituent not detected.
2,4-Db	0 / 67	ND	ND	ND	**0.32**	**2.1**	0.087	No	Constituent not detected.
4,4'-DDD	1 / 67	0.00069	0.00069	DC-9-0.5	0.0033	0.076	0.15	No	Maximum detect below screening value.
4,4'-DDE	1 / 67	0.0046	0.0046	DC-22-0.5	0.0033	0.076	1.11	No	Maximum detect below screening value.
4,4'-DDT	3 / 67	0.001	0.0028	BC-4-2	0.0033	0.076	1.61	No	Maximum detect below screening value.
Aldrin	0 / 67	ND	ND	ND	0.0017	**0.038**	0.016	No	Constituent not detected.
Alpha-BHC	0 / 67	ND	ND	ND	**0.0017**	**0.038**	0.00087	No	Constituent not detected.
Beta-BHC	0 / 67	ND	ND	ND	0.0017	**0.038**	0.0031	No	Constituent not detected.
Delta-BHC	0 / 48	ND	ND	ND	0.0017	0.038	NA	No	Constituent not detected.
Alpha-Chlordane [8]	2 / 67	0.0013	0.027	BC-3-0.5	0.0017	0.019	0.31	No	Maximum detect below screening value.
Dalapon	0 / 67	ND	ND	ND	**1.6**	**10**	0.23	No	Constituent not detected.
Dicamba	0 / 67	ND	ND	ND	0.032	0.21	0.27	No	Constituent not detected.
Dichoroprop	0 / 67	ND	ND	ND	0.32	2.1	NA	No	Constituent not detected.
Dieldrin	1 / 67	0.00051	0.00051	DC-SUMP-0.5	**0.0017**	**0.038**	0.0015	No	Maximum detect below screening value.
Dinoseb	0 / 67	ND	ND	ND	**0.79**	**5.1**	0.24	No	Constituent not detected.
Endosulfan I [9]	0 / 67	ND	ND	ND	0.0017	0.038	2.65	No	Constituent not detected.
Endosulfan II [9]	0 / 67	ND	ND	ND	0.0017	0.038	2.65	No	Constituent not detected.
Endosulfan sulfate [9]	1 / 67	0.0027	0.0027	BC-4-2	0.0033	0.076	2.65	No	Maximum detect below screening value.
Endrin	0 / 67	ND	ND	ND	0.0033	0.076	0.16	No	Constituent not detected.

TABLE 2-9
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Herbicides/Pesticides (continued)									
Endrin aldehyde [10]	1 / 67	0.0013	0.0013	BC-4-2	0.0033	0.076	0.16	No	Maximum detect below screening value.
Endrin ketone [10]	2 / 67	0.0018	0.0315	DC-22-0.5	0.0033	0.076	0.16	No	Maximum detect below screening value.
Gamma-BHC	0 / 67	ND	ND	ND	0.0017	**0.038**	0.0051	No	Constituent not detected.
Gamma-Chlordane [8]	2 / 67	0.0017	0.047	BC-3-0.5	0.0017	0.019	0.31	No	Maximum detect below screening value.
Heptachlor	0 / 67	ND	ND	ND	0.0017	**0.038**	0.0034	No	Constituent not detected.
Heptachlor epoxide	1 / 67	0.0191	0.0191	BC-3-0.5	**0.0017**	**0.019**	0.0016	**YES**	Maximum detect exceeds screening value.
Mcpa	0 / 67	ND	ND	ND	**32**	**210**	0.0036	No	Constituent not detected.
Mcpp	2 / 67	26.5	93.5	DC-24-2	**32**	**210**	0.0084	**YES**	Maximum detect exceeds screening value.
Methoxychlor	2 / 67	0.0093	0.094	DC-SUMP-0.5	0.0033	0.076	3.62	No	Maximum detect below screening value.
Pentachlorophenol	4 / 67	0.0089	0.057	BC-3-0.5	**0.032**	**0.21**	0.0087	**YES**	Maximum detect exceeds screening value.
Silvex (2,4,5-TP)	0 / 67	ND	ND	ND	0.032	**0.21**	0.11	No	Constituent not detected.
Toxaphene	1 / 67	2.15	2.15	BC-3-0.5	**0.083**	**0.96**	0.05061	**YES**	Maximum detect exceeds screening value.
Total Metals									
Aluminum	65 / 65	6280	23500	DC-22-2	--	--	55430	No	Maximum detect below screening value.
Antimony	0 / 69	ND	ND	ND	**0.87**	**6.1**	0.6507	No	Constituent not detected.
Arsenic	92 / 97	0.56	176	S1-2-2	**1.1**	**41**	0.031	**YES**	Maximum detect exceeds screening value.
Barium	95 / 95	10.9	480	DC-19-0.5	--	--	289	**YES**	Maximum detect exceeds screening value.
Beryllium	7 / 69	0.26	1.3	DC-21-2	0.11	1.5	31.33	No	Maximum detect below screening value.
Boron	7 / 22	10.3	11.7	DC-2-0.5	9.2	11	23.859	No	Maximum detect below screening value.
Cadmium	8 / 97	0.29	8.7	S2-1-0.5	0.17	1.2	1.25	**YES**	Maximum detect exceeds screening value.
Calcium	68 / 68	258	29100	DC-13-0.5	--	--	NA	No	Essential Nutrient.
Chromium [11]	97 / 97	0.61	252	S2-1-0.5	--	--	57840000	No	Maximum detect below screening value.
Cobalt	7 / 69	1.1	20.1	DC-13-0.5	**9**	**15**	0.51	**YES**	Maximum detect exceeds screening value.
Copper	69 / 69	1.2	44.6	DC-20-0.5	--	--	53.0	No	Maximum detect below screening value.
Iron	68 / 68	1910	49500	DC-22-0.5	--	--	651	**YES**	Maximum detect exceeds screening value.
Lead	96 / 97	1.2	813	S2-1-0.5	4.1	4.1	NA	No	Screening value not available.
Lithium	0 / 22	ND	ND	ND	**460**	**540**	22.4	No	Constituent not detected.
Manganese	68 / 68	19.1	1390	DC-20-0.5	--	--	50.6	**YES**	Maximum detect exceeds screening value.
Magnesium	66 / 68	640	5660	BC-1-2	220	950	NA	No	Essential Nutrient.
Mercury	13 / 95	0.044	2	S3-1-0.5	0.037	0.054	0.08	**YES**	Maximum detect exceeds screening value.
Molybdenum	0 / 69	ND	ND	ND	1.7	**15**	3.86	No	Constituent not detected.
Nickel	69 / 69	1.7	41.7	DC-22-0.5	--	--	48.2	No	Maximum detect below screening value.
Potassium	56 / 68	1580	4350	DC-14-0.5	430	3000	NA	No	Essential Nutrient.
Selenium	2 / 97	1.1	5.8	DC-22-0.5	0.83	**6.1**	0.96	**YES**	Maximum detect exceeds screening value.
Silver	0 / 97	ND	ND	ND	0.41	**3.1**	1.45	No	Constituent not detected.
Sodium	0 / 68	ND	ND	ND	430	3100	NA	No	Constituent not detected.

TABLE 2-9
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - CENTRAL AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Total Metals (continued)									
Strontium (Total)	65 / 65	36.7	128	DC-13-0.5	- -	- -	795	No	Maximum detect below screening value.
Thallium	0 / 69	ND	ND	ND	**0.49**	**3.1**	0.027	No	Constituent not detected.
Tin	1 / 65	13	13	BC-4-0.5	2.4	15	5543	No	Maximum detect below screening value.
Titanium [12]	65 / 65	58	239	DC-22-0.5	- -	- -	1.42	**YES**	Maximum detect exceeds screening value.
Vanadium	69 / 69	3.5	39.6	BC-1-2	- -	- -	152	No	Maximum detect below screening value.
Zinc	68 / 69	21.3	472	DC-19-0.5	10.8	10.8	699	No	Maximum detect below screening value.

Notes:
ND - Not Detected
NA - Not Available
"- -" - Constituent detected in every sample; detection limit not presented.
[1] Risk-Based Soil Screening Levels (SSLs) for protection of groundwater from USEPA (2013a) based on a site specific DAF of 24.1. Non-cancer based screening levels reflect a hazard quotient of 0.1.
[2] The SSL for 4-isopropyltoluene is based on the SSL for isopropylbenzene.
[3] The SSL for m,p-xylenes is conservatively based on the SSL for m-xylene.
[4] The SSL for acenapthylene is based on the SSL for acenapthene.
[5] The SSL for benzo(g,h,i)perylene is based on the SSL for pyrene.
[6] The SSL for m,p-cresol is conservatively based on the SSL for m-cresol.
[7] The SSL for phenanthrene is based on the SSL for anthracene.
[8] The SSLs for alpha- and gamma-chlordane are based on the SSL for chlordane.
[9] The SSLs for endosulfan I, II and endosulfan sulfate are based on the SSL for endosulfan.
[10] The SSLs for endrin aldehyde and endrin ketone are based on the SSL for endrin.
[11] Site-specific SSL for total chromium is based on the assumption that hexavalent and trivalent chromium are present at a ratio of 1:6 (Cr IV to Cr III). See text Section 2.4.1.
[12] The SSL for titanium is based on the SSL for titanium tetrachloride.
Bold detection limits indicates the value exceeds the RSL.

TABLE 2-10
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Volatile Organics									
1,1,1,2-Tetrachloroethane	0 / 180	ND	ND	ND	0.0018	**20.9**	9.3	No	Constituent not detected.
1,1,1-Trichloroethane	25 / 180	0.0015	0.592	A10-2-INT	0.0025	20.9	3800	No	Maximum detect below screening value.
1,1,2,2-Tetrachloroethane	0 / 180	ND	ND	ND	0.0018	**20.9**	2.8	No	Constituent not detected.
1,1,2-Trichloroethane	1 / 180	0.0064	0.0064	JC-7-10	0.0018	**20.9**	0.68	No	Maximum detect below screening value.
1,1-Dichloroethane	23 / 180	0.0013	0.221	A10-2-INT	0.0025	**20.9**	17	No	Maximum detect below screening value.
1,1-Dichloroethene	11 / 180	0.00081	0.045	S25-2-0.5	0.0025	20.9	110	No	Maximum detect below screening value.
1,1-Dichloropropene	0 / 180	ND	ND	ND	0.0018	20.9	NA	No	Constituent not detected.
1,2,3-Trichlorobenzene	0 / 180	ND	ND	ND	0.0018	20.9	49	No	Constituent not detected.
1,2,3-Trichloropropane	0 / 180	ND	ND	ND	0.0018	**20.9**	0.095	No	Constituent not detected.
1,2,4-Trichlorobenzene	0 / 180	ND	ND	ND	0.0018	20.9	27	No	Constituent not detected.
1,2,4-Trimethylbenzene	28 / 180	0.002	107	A12-3-10	0.0018	2.69	26	**YES**	Maximum detect exceeds screening value.
1,2-Dibromoethane	0 / 180	ND	ND	ND	0.0018	**20.9**	0.17	No	Constituent not detected.
1,2-Dichlorobenzene	5 / 180	0.0019	0.099599998	NBJ-1-5	0.0018	20.9	980	No	Maximum detect below screening value.
1,2-Dichloroethane	1 / 180	0.0018	0.0018	A10-2-INT	0.0018	**20.9**	2.2	No	Maximum detect below screening value.
1,2-Dichloroethene, Total	5 / 27	0.0034	0.020200001	SEBJ-5-15	0.0028	20.9	920	No	Maximum detect below screening value.
1,2-Dichloropropane	0 / 180	ND	ND	ND	0.0018	**20.9**	4.7	No	Constituent not detected.
1,3,5-Trimethylbenzene	21 / 180	0.0011	51.3	A12-3-10	0.0018	2.69	1000	No	Maximum detect below screening value.
1,3-Dichlorobenzene	0 / 180	ND	ND	ND	0.0018	20.9	NA	No	Constituent not detected.
1,3-Dichloropropane	0 / 180	ND	ND	ND	0.0018	20.9	2000	No	Constituent not detected.
1,4-Dichlorobenzene	1 / 180	0.0014	0.0014	NBJ-1-5	0.0018	**20.9**	12	No	Maximum detect below screening value.
1,4-Dioxane	1 / 153	0.171	0.2	JC-14-2	0.074	**90**	17	No	Maximum detect below screening value.
2,2-Dichloropropane	0 / 180	ND	ND	ND	0.0018	20.9	NA	No	Constituent not detected.
2-Butanone	14 / 180	0.005	0.105	A12-8-15	0.0056	41.8	20000	No	Maximum detect below screening value.
2-Chloroethyl vinyl ether	0 / 148	ND	ND	ND	0.0092	11	NA	No	Constituent not detected.
2-Chlorotoluene	0 / 180	ND	ND	ND	0.0018	20.9	2000	No	Constituent not detected.
2-Hexanone (methyl butyl ketone)	2 / 180	0.0087	0.055599998	A12-8-15	0.0092	83.6	140	No	Maximum detect below screening value.
3-Chloro-1,2-dibromopropane	0 / 27	ND	ND	ND	0.0056	**41.8**	0.069	No	Constituent not detected.
4-Chlorotoluene	0 / 180	ND	ND	ND	0.0018	20.9	2000	No	Constituent not detected.
4-Isopropyltoluene [2]	11 / 180	0.0012	3.61	A12-3-10	0.0018	20.9	1100	No	Maximum detect below screening value.
4-Methyl-2-pentanone	4 / 180	0.0255	6.29	S22-2-5	0.0056	41.8	5300	No	Maximum detect below screening value.
Acetone	59 / 180	0.011	0.784	S22-1-0.5	0.0112	83.6	63000	No	Maximum detect below screening value.
Acrolein	0 / 153	ND	ND	ND	0.0092	**11**	0.065	No	Constituent not detected.
Acrylonitrile	0 / 153	ND	ND	ND	0.0092	**11**	1.2	No	Constituent not detected.
Benzene	3 / 180	0.0012	0.0144	S22-2-0.5	0.0018	**20.9**	5.4	No	Maximum detect below screening value.
Bromobenzene	0 / 180	ND	ND	ND	0.0018	20.9	180	No	Constituent not detected.
Bromochloromethane	0 / 180	ND	ND	ND	0.0018	20.9	68	No	Constituent not detected.
Bromodichloromethane	0 / 180	ND	ND	ND	0.0018	**20.9**	1.4	No	Constituent not detected.

TABLE 2-10
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Volatile Organics (continued)									
Bromoform	0 / 180	ND	ND	ND	0.0018	20.9	220	No	Constituent not detected.
Bromomethane	0 / 180	ND	ND	ND	0.0018	**20.9**	3.2	No	Constituent not detected.
Carbon Disulfide	6 / 179	0.0024	0.0053	S22-2-INT	0.0018	20.9	370	No	Maximum detect below screening value.
Carbon Tetrachloride	0 / 180	ND	ND	ND	0.0018	**20.9**	3	No	Constituent not detected.
Chlorobenzene	0 / 180	ND	ND	ND	0.0018	20.9	140	No	Constituent not detected.
Dibromochloromethane	0 / 180	ND	ND	ND	0.0018	**20.9**	3.3	No	Constituent not detected.
Chloroethane	0 / 180	ND	ND	ND	0.0018	20.9	6100	No	Constituent not detected.
Chloroform	0 / 180	ND	ND	ND	0.0018	**20.9**	1.5	No	Constituent not detected.
Chloromethane	0 / 180	ND	ND	ND	0.0018	20.9	50	No	Constituent not detected.
Cis-1,2-Dichloroethene	62 / 180	0.0018	57.3	A12-3-10	0.0025	20.9	200	No	Maximum detect below screening value.
Cis-1,3-Dichloropropene	0 / 180	ND	ND	ND	0.0018	20.9	NA	No	Constituent not detected.
Dibromomethane	0 / 180	ND	ND	ND	0.0018	**20.9**	11	No	Constituent not detected.
Dichlorodifluoromethane	0 / 180	ND	ND	ND	0.0018	20.9	40	No	Constituent not detected.
Ethylbenzene	27 / 180	0.0016	881	A12-3-10	0.0018	0.0086	27	**YES**	Maximum detect exceeds screening value.
Hexachlorobutadiene	0 / 180	ND	ND	ND	0.0018	20.9	22	No	Constituent not detected.
Isopropylbenzene	23 / 180	0.001	29.8	A12-3-10	0.0018	20.9	1100	No	Maximum detect below screening value.
m,p-Xylenes [3]	24 / 153	0.0031	3550	A12-3-10	0.0037	0.017	250	**YES**	Maximum detect exceeds screening value.
Methyl tert-butyl ether	0 / 170	ND	ND	ND	0.0025	20.9	220	No	Constituent not detected.
Methylene chloride	0 / 180	ND	ND	ND	0.0028	20.9	310	No	Constituent not detected.
Naphthalene	16 / 180	0.0034	4.96	A12-3-10	0.0018	**41.8**	18	**YES**	Maximum detection limit exceeds screening value. [4]
N-Butylbenzene	18 / 180	0.0014	4.24	A12-3-10	0.0018	20.9	5100	No	Maximum detect below screening value.
N-Propylbenzene	24 / 180	0.0014	34	A12-3-10	0.0018	20.9	2100	No	Maximum detect below screening value.
o-Xylene	23 / 153	0.001	1090	A12-3-10	0.0018	0.0086	300	**YES**	Maximum detect exceeds screening value.
Sec-Butylbenzene	18 / 180	0.0012	69.800	A12-8-10	0.0018	2.69	10000	No	Maximum detect below screening value.
Styrene	1 / 180	13.2	13.2	A12-3-10	0.0018	20.9	3600	No	Maximum detect below screening value.
Tert-Butylbenzene	5 / 180	0.0019	0.147	A12-3-2	0.0018	20.9	10000	No	Maximum detect below screening value.
Tetrachloroethene	109 / 180	0.00082	277	A12-3-10	0.0028	20.9	41	**YES**	Maximum detect exceeds screening value.
Toluene	30 / 180	0.0014	1130	A12-3-10	0.0018	0.258	4500	No	Maximum detect below screening value.
Total Xylenes	34 / 180	0.001	4640	A12-3-10	0.0028	0.017	270	**YES**	Maximum detect exceeds screening value.
Trans-1,2-Dichloroethene	10 / 180	0.00066	0.0067	NBJ-1-5	0.0018	20.9	69	No	Maximum detect below screening value.
Trans-1,3-Dichloropropene	0 / 180	ND	ND	ND	0.0018	20.9	NA	No	Constituent not detected.
Trichloroethene	58 / 180	0.00095	28.2	A12-3-10	0.0027	**20.9**	2	**YES**	Maximum detect exceeds screening value.
Trichlorofluoromethane	0 / 180	ND	ND	ND	0.0018	20.9	340	No	Constituent not detected.
Vinyl Acetate	0 / 153	ND	ND	ND	0.0092	11	410	No	Constituent not detected.
Vinyl Chloride	19 / 180	0.0013	2.16	NBJ-1-5	0.0018	**20.9**	1.7	**YES**	Maximum detect exceeds screening value.
Dibromochloropropane (DBCP)	0 / 153	ND	ND	ND	0.0018	2.3	NA	No	Constituent not detected.

TABLE 2-10
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
VOCs - Method 3810 Mod									
Benzene	2 / 97	0.137	0.147	A12-8-10	0.0084	0.0084	5.4	No	Maximum detect below screening value.
Cis-1,2-Dichloroethene	29 / 97	0.005	0.403	SEBJ-9-20	0.0084	0.0084	200	No	Maximum detect below screening value.
Ethylbenzene	5 / 97	0.0315	22.1	A12-8-10	0.0084	0.0084	27	No	Maximum detect below screening value.
Tetrachloroethene	59 / 97	0.0085	1.008	A12-8-10	0.0084	0.0084	41	No	Maximum detect below screening value.
Toluene	5 / 97	0.0231	57.414	A12-8-10	0.0084	0.0084	4500	No	Maximum detect below screening value.
Trichloroethene	27 / 97	0.0058	0.069300003	SEBJ-8-15	0.0084	0.0084	2	No	Maximum detect below screening value.
Total Xylenes	7 / 97	0.137	96.6	A12-8-10	0.0084	0.0084	270	No	Maximum detect below screening value.
Semi-Volatile Organics									
1,2,4-Trichlorobenzene	0 / 35	ND	ND	ND	0.16	0.22	27	No	Constituent not detected.
1,2-Dichlorobenzene	0 / 35	ND	ND	ND	0.16	0.22	980	No	Constituent not detected.
1,2-Diphenylhydrazine	0 / 35	ND	ND	ND	0.16	0.22	2.2	No	Constituent not detected.
1,3-Dichlorobenzene	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
1,4-Dichlorobenzene	0 / 35	ND	ND	ND	0.16	0.22	12	No	Constituent not detected.
1-Methylnaphthalene	1 / 35	0.075	0.075	S25-2-0.5	0.16	0.22	53	No	Maximum detect below screening value.
2,4,5-Trichlorophenol	0 / 35	ND	ND	ND	0.16	0.22	6200	No	Constituent not detected.
2,4,6-Trichlorophenol	0 / 35	ND	ND	ND	0.16	0.22	62	No	Constituent not detected.
2,4-Dichlorophenol	0 / 35	ND	ND	ND	0.16	0.22	180	No	Constituent not detected.
2,4-Dimethylphenol	0 / 35	ND	ND	ND	0.16	0.22	1200	No	Constituent not detected.
2,4-Dinitrophenol	0 / 35	ND	ND	ND	0.82	1.1	120	No	Constituent not detected.
2,4-Dinitrotoluene	0 / 35	ND	ND	ND	0.16	0.22	5.5	No	Constituent not detected.
2,6-Dinitrotoluene	0 / 35	ND	ND	ND	0.16	0.22	1.2	No	Constituent not detected.
2-Chloronaphthalene	0 / 35	ND	ND	ND	0.16	0.22	8200	No	Constituent not detected.
2-Chlorophenol	0 / 35	ND	ND	ND	0.16	0.22	510	No	Constituent not detected.
2-Methylnaphthalene	2 / 35	0.028	0.086599998	S25-2-0.5	0.16	0.22	220	No	Maximum detect below screening value.
2-Methylphenol	0 / 35	ND	ND	ND	0.16	0.22	3100	No	Constituent not detected.
2-Nitroaniline	0 / 35	ND	ND	ND	0.16	0.22	600	No	Constituent not detected.
2-Nitrophenol	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
3,3'-Dichlorobenzidine	0 / 33	ND	ND	ND	0.16	0.22	3.8	No	Constituent not detected.
3-Nitroaniline	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
4,6-Dinitro-2-methylphenol	0 / 35	ND	ND	ND	0.33	0.44	4.9	No	Constituent not detected.
4-Bromophenyl phenyl ether	0 / 33	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
4-Chloro-3-Methylphenol	0 / 35	ND	ND	ND	0.16	0.22	6200	No	Constituent not detected.
4-Chloroaniline	0 / 35	ND	ND	ND	0.16	0.22	8.6	No	Constituent not detected.
4-Chlorophenyl phenyl ether	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
4-Nitroaniline	0 / 35	ND	ND	ND	0.16	0.22	86	No	Constituent not detected.
4-Nitrophenol	0 / 33	ND	ND	ND	0.82	1.1	NA	No	Constituent not detected.
Acenaphthene	0 / 35	ND	ND	ND	0.16	0.22	3300	No	Constituent not detected.

TABLE 2-10
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
Acenaphthylene	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
Aniline	0 / 35	ND	ND	ND	0.16	0.22	300	No	Constituent not detected.
Anthracene	1 / 35	0.057	0.057	S25-2-0.5	0.16	0.22	17000	No	Maximum detect below screening value.
Benzidine	0 / 35	ND	ND	ND	**1.6**	**2.2**	0.0075	No	Constituent not detected.
Benzo(a)anthracene	3 / 35	0.029	0.161	S25-2-0.5	0.16	0.21	2.1	No	Maximum detect below screening value.
Benzo(a)pyrene	2 / 35	0.046	0.141	S25-2-0.5	0.16	**0.22**	0.21	**YES**	Maximum detection limit exceeds screening value. [5]
Benzo(b)fluoranthene	3 / 35	0.049	0.146	S25-2-0.5	0.16	0.21	2.1	No	Maximum detect below screening value.
Benzo(g,h,i)perylene [6]	3 / 35	0.041	0.171	S25-2-0.5	0.16	0.21	1700	No	Maximum detect below screening value.
Benzo(k)fluoranthene	1 / 35	0.097	0.097	S25-2-0.5	0.16	0.22	21	No	Maximum detect below screening value.
Benzoic Acid	0 / 35	ND	ND	ND	0.82	1.1	250000	No	Constituent not detected.
Benzyl Alcohol	1 / 35	0.579	0.579	JC-3-0.5	0.16	0.22	6200	No	Maximum detect below screening value.
Bis(2-Chloroethoxy)methane	0 / 35	ND	ND	ND	0.16	0.22	180	No	Constituent not detected.
Bis(2-Chloroethyl)ether	0 / 35	ND	ND	ND	0.16	0.22	1	No	Constituent not detected.
Bis(2-Chloroisopropyl)ether	0 / 35	ND	ND	ND	0.16	0.22	22	No	Constituent not detected.
Bis(2-Ethylhexyl) phthalate	1 / 35	0.612	0.612	A11-1-0.5	0.33	0.44	120	No	Maximum detect below screening value.
Butyl benzyl phthalate	1 / 35	0.901	0.901	A11-1-0.5	0.16	0.22	910	No	Maximum detect below screening value.
Carbazole [7]	1 / 35	0.027	0.027	S25-2-0.5	0.16	0.22	NA	No	Screening value not available.
Chrysene	3 / 35	0.030	0.252	S25-2-0.5	0.16	0.21	210	No	Maximum detect below screening value.
Dibenz(a,h)anthracene	1 / 35	0.037	0.037	S25-2-0.5	0.16	**0.22**	0.21	No	Maximum detect below screening value.
Dibenzofuran	1 / 35	0.033	0.033	S25-2-0.5	0.16	0.22	100	No	Maximum detect below screening value.
Diethyl Phthalate	0 / 35	ND	ND	ND	0.33	0.44	49000	No	Constituent not detected.
Dimethyl Phthalate	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
Di-N-butyl phthalate	0 / 35	ND	ND	ND	0.33	0.44	6200	No	Constituent not detected.
Di-N-octyl phthalate	0 / 35	ND	ND	ND	0.16	0.22	620	No	Constituent not detected.
Fluoranthene	3 / 35	0.042	0.243	S25-2-0.5	0.16	0.21	2200	No	Maximum detect below screening value.
Fluorene	0 / 35	ND	ND	ND	0.16	0.22	2200	No	Constituent not detected.
Hexachloro-1,3-cyclopentadiene	0 / 35	ND	ND	ND	0.16	0.22	370	No	Constituent not detected.
Hexachlorobenzene	0 / 35	ND	ND	ND	0.16	0.22	1.1	No	Constituent not detected.
Hexachlorobutadiene	0 / 35	ND	ND	ND	0.16	0.22	22	No	Constituent not detected.
Hexachloroethane	0 / 35	ND	ND	ND	0.16	0.22	43	No	Constituent not detected.
Indeno(1,2,3-cd)pyrene	3 / 35	0.032	0.11	S25-2-0.5	0.16	0.21	2.1	No	Maximum detect below screening value.
Isophorone	0 / 35	ND	ND	ND	0.16	0.22	1800	No	Constituent not detected.
m-,p-Cresol mixture	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
Naphthalene	2 / 35	0.025	0.042	S25-2-0.5	0.16	0.21	18	No	Maximum detect below screening value.
Nitrobenzene	0 / 35	ND	ND	ND	0.16	0.22	24	No	Constituent not detected.
N-Nitrosodimethylamine	0 / 35	ND	ND	ND	**0.33**	**0.44**	0.034	No	Constituent not detected.
N-Nitrosodi-N-propylamine	0 / 35	ND	ND	ND	0.16	0.22	0.25	No	Constituent not detected.

TABLE 2-10
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
N-Nitrosodiphenylamine	0 / 35	ND	ND	ND	0.16	0.22	350	No	Constituent not detected.
Pentachlorophenol	0 / 35	ND	ND	ND	0.82	1.1	2.7	No	Constituent not detected.
Phenanthrene [8]	3 / 35	0.0314	0.367	S25-2-0.5	0.16	0.21	17000	No	Maximum detect below screening value.
Phenol	0 / 35	ND	ND	ND	0.16	0.22	18000	No	Constituent not detected.
Pyrene	3 / 35	0.036099998	0.326	S25-2-0.5	0.16	0.21	1700	No	Maximum detect below screening value.
Pyridine	0 / 35	ND	ND	ND	0.33	0.44	100	No	Constituent not detected.
PCBs									
Aroclor-1016	0 / 27	ND	ND	ND	0.016	0.021	3.7	No	Constituent not detected.
Aroclor-1221	0 / 27	ND	ND	ND	0.016	0.021	0.54	No	Constituent not detected.
Aroclor-1232	0 / 27	ND	ND	ND	0.016	0.021	0.54	No	Constituent not detected.
Aroclor-1242	0 / 27	ND	ND	ND	0.016	0.021	0.74	No	Constituent not detected.
Aroclor-1248	0 / 27	ND	ND	ND	0.016	0.021	0.74	No	Constituent not detected.
Aroclor-1254	3 / 27	0.008	0.095	JC-7-0.5	0.016	0.021	0.74	No	Maximum detect below screening value.
Aroclor-1260	0 / 27	ND	ND	ND	0.016	0.021	0.74	No	Constituent not detected.
Total Petroleum Hydrocarbons (TPH)									
DRO (C10-C28) Range	3 / 29	3.32	8.44	JC-6-2	8.2	12	NA	No	Evaluated through individual constituents including BTEX and naphthalene.
Herbicides/Pesticides									
2,4,5-T	14 / 28	0.008	0.0184	JC-9-0.5	0.033	0.049	620	No	Maximum detect below screening value.
2,4-D	0 / 28	ND	ND	ND	0.33	0.49	770	No	Constituent not detected.
2,4-Db	0 / 28	ND	ND	ND	0.33	0.49	490	No	Constituent not detected.
4,4'-DDD	0 / 29	ND	ND	ND	0.0033	0.0042	7.2	No	Constituent not detected.
4,4'-DDE	0 / 29	ND	ND	ND	0.0033	0.0042	5.1	No	Constituent not detected.
4,4'-DDT	0 / 29	ND	ND	ND	0.0033	0.0042	7	No	Constituent not detected.
Aldrin	0 / 29	ND	ND	ND	0.0016	0.0021	0.1	No	Constituent not detected.
Alpha-BHC	0 / 29	ND	ND	ND	0.0016	0.0021	0.27	No	Constituent not detected.
Beta-BHC	0 / 29	ND	ND	ND	0.0016	0.0021	0.96	No	Constituent not detected.
Delta-BHC	0 / 29	ND	ND	ND	0.0016	0.0021	NA	No	Constituent not detected.
Alpha-Chlordane	0 / 29	ND	ND	ND	0.0016	0.0021	NA	No	Constituent not detected.
Dalapon	6 / 28	0.48	0.71	JC-3-2	1.6	2.5	1800	No	Maximum detect below screening value.
Dicamba	0 / 28	ND	ND	ND	0.033	0.049	1800	No	Constituent not detected.
Dichoroprop	0 / 28	ND	ND	ND	0.33	0.49	NA	No	Constituent not detected.
Dieldrin	0 / 29	ND	ND	ND	0.0016	0.0021	0.11	No	Constituent not detected.
Dinoseb	0 / 20	ND	ND	ND	0.82	1	62	No	Constituent not detected.
Endosulfan I	0 / 29	ND	ND	ND	0.0016	0.0021	NA	No	Constituent not detected.
Endosulfan II	0 / 29	ND	ND	ND	0.0016	0.0021	NA	No	Constituent not detected.
Endosulfan sulfate	0 / 29	ND	ND	ND	0.0033	0.0042	NA	No	Constituent not detected.
Endrin	0 / 29	ND	ND	ND	0.0033	0.0042	18	No	Constituent not detected.

TABLE 2-10
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Herbicides/Pesticides (continued)									
Endrin aldehyde	0 / 29	ND	ND	ND	0.0033	0.0042	18	No	Constituent not detected.
Endrin ketone	0 / 29	ND	ND	ND	0.0033	0.0042	18	No	Constituent not detected.
Gamma-BHC	0 / 29	ND	ND	ND	0.0016	0.0021	2.1	No	Constituent not detected.
Gamma-Chlordane	0 / 29	ND	ND	ND	0.0016	0.0021	NA	No	Constituent not detected.
Heptachlor	0 / 29	ND	ND	ND	0.0016	0.0021	0.38	No	Constituent not detected.
Heptachlor epoxide	0 / 29	ND	ND	ND	0.0016	0.0021	0.19	No	Constituent not detected.
Mcpa	0 / 28	ND	ND	ND	**33**	**49**	31	No	Constituent not detected.
Mcpp	0 / 28	ND	ND	ND	33	49	62	No	Constituent not detected.
Methoxychlor	0 / 29	ND	ND	ND	0.0033	0.0042	310	No	Constituent not detected.
Pentachlorophenol	0 / 28	ND	ND	ND	0.033	0.049	2.7	No	Constituent not detected.
Silvex (2,4,5-TP)	0 / 28	ND	ND	ND	0.033	0.049	490	No	Constituent not detected.
Toxaphene	0 / 29	ND	ND	ND	0.082	0.1	1.6	No	Constituent not detected.
Total Metals									
Aluminum	30 / 30	779	10400	JC-5-5	--	--	99000	No	Maximum detect below screening value.
Antimony	0 / 30	ND	ND	ND	0.8	6	41	No	Constituent not detected.
Arsenic	42 / 68	0.94	43.200001	A10-3-2	1.6	**7.6**	2.4	**YES**	Maximum detect exceeds screening value.
Barium	42 / 68	14.3	1730	A10-4-5	32	60	19000	No	Maximum detect below screening value.
Beryllium	0 / 30	ND	ND	ND	0.2	1.5	200	No	Constituent not detected.
Boron	0 / 2	ND	ND	ND	9.4	10	20000	No	Constituent not detected.
Cadmium	15 / 68	0.4	16.6	A10-4-2	0.15	1.2	80	No	Maximum detect below screening value.
Calcium	27 / 31	1100	5010	T6-2-20	970	1300	NA	No	Essential Nutrient.
Chromium [9]	48 / 68	1.3	197	A10-2-0.5	1.7	2.5	128572	No	Maximum detect below screening value.
Cobalt	1 / 30	10.4	10.4	JC-13-0.5	2	15	30	No	Maximum detect below screening value.
Copper	4 / 30	2.2	9.7	JC-5-5	2.4	7.5	4100	No	Maximum detect below screening value.
Iron	31 / 31	1610	21800	T6-2-20	--	--	72000	No	Maximum detect below screening value.
Lead	56 / 77	2.1	4970	A10-4-5	3.2	5.1	800	**YES**	Maximum detect exceeds screening value.
Lithium	0 / 2	ND	ND	ND	**470**	**520**	200	No	Constituent not detected.
Manganese	33 / 33	22.1	680	T6-2-15	--	--	2300	No	Maximum detect below screening value.
Magnesium	7 / 33	448	7400	T6-2-20	470	1300	NA	No	Essential Nutrient.
Mercury	15 / 68	0.062	3.5	A10-4-2	0.037	0.055	4.3	No	Maximum detect below screening value.
Molybdenum	0 / 30	ND	ND	ND	2	15	510	No	Constituent not detected.
Nickel	2 / 30	3.4	13.0	JC-5-5	3.5	12	2000	No	Maximum detect below screening value.
Potassium	2 / 31	2580	3910	T6-2-20	440	3000	NA	No	Essential Nutrient.
Selenium	2 / 68	0.71	4.2	JC-10-2	0.74	15	510	No	Maximum detect below screening value.
Silver	2 / 68	1.8	3.1	A10-4-15	0.35	7.6	510	No	Maximum detect below screening value.
Sodium	0 / 32	ND	ND	ND	400	3000	NA	No	Constituent not detected.

TABLE 2-10
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	USEPA Industrial Soil RSL [1] (mg/kg)	Constituent of Interest	Comment
Total Metals (continued)									
Strontium (Total)	30 / 30	5.7	53.200001	JC-5-5	- -	- -	61000	No	Maximum detect below screening value.
Thallium	0 / 30	ND	ND	ND	0.4	**9**	1	No	Constituent not detected.
Tin	0 / 30	ND	ND	ND	2	15	61000	No	Constituent not detected.
Titanium [10]	30 / 30	31.799999	104	JC-5-0.5	- -	- -	60000	No	Maximum detect below screening value.
Vanadium	5 / 30	6.6	25.4	JC-5-0.5	7.9	13	510	No	Maximum detect below screening value.
Zinc	30 / 30	6.0	28.6	JC-5-0.5	- -	- -	31000	No	Maximum detect below screening value.

Notes:
ND - Not Detected
NA - Not Available
"- -" - Constituent detected in every sample; detection limit not presented.
[1] Regional Screening Levels (RSLs) for industrial direct contact from USEPA (2013a). Non-cancer based screening levels reflect a hazard quotient of 0.1.
[2] The RSL for 4-isopropyltoluene is based on the RSL for isopropylbenzene.
[3] The RSL for m,p-xylenes is conservatively based on the RSL for m-xylene.
[4] Naphthalene is retained as a COI because the detection limit exceeded the RSL, and naphthalene is a COI for direct contact in other onsite areas.
[5] Benzo(a)pyrene is retained as a COI because the detection limit exceeded the RSL, and benzo(a)pyrene is a COI for direct contact in other onsite areas.
[6] The RSL for benzo(g,h,i)perylene is based on the RSL for pyrene.
[7] No screening value is available for this constituent; and no toxicity values are available for quantitative evaluation.
[8] The RSL for phenanthrene is based on the RSL for anthracene.
[9] Industrial soil RSL for total chromium is based on the assumption that hexavalent and trivalent chromium are present at a ratio of 1:6 (Cr IV to Cr III). See text Section 2.4.1.
[10] The RSL for titanium is based on the RSL for titanium tetrachloride.
Bold detection limits indicates the value exceeds the RSL.

TABLE 2-11
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Volatile Organics									
1,1,1,2-Tetrachloroethane	0 / 180	ND	ND	ND	0.0018	**20.9**	0.0046	No	Constituent not detected.
1,1,1-Trichloroethane	25 / 180	0.0015	0.592	A10-2-INT	0.0025	**20.9**	6.27	No	Maximum detect below screening value.
1,1,2,2-Tetrachloroethane	0 / 180	ND	ND	ND	**0.0018**	**20.9**	0.00063	No	Constituent not detected.
1,1,2-Trichloroethane	1 / 180	0.0064	0.0064	JC-7-10	**0.0018**	**20.9**	0.00031	**YES**	Maximum detect exceeds screening value.
1,1-Dichloroethane	23 / 180	0.0013	0.221	A10-2-INT	0.0025	**20.9**	0.016	**YES**	Maximum detect exceeds screening value.
1,1-Dichloroethene	11 / 180	0.00081	0.045	S25-2-0.5	0.0025	**20.9**	0.22	No	Maximum detect below screening value.
1,1-Dichloropropene	0 / 180	ND	ND	ND	0.0018	20.9	NA	No	Constituent not detected.
1,2,3-Trichlorobenzene	0 / 180	ND	ND	ND	0.0018	**20.9**	0.036	No	Constituent not detected.
1,2,3-Trichloropropane	0 / 180	ND	ND	ND	**0.0018**	**20.9**	0.0000067	No	Constituent not detected.
1,2,4-Trichlorobenzene	0 / 180	ND	ND	ND	0.0018	**20.9**	0.027	No	Constituent not detected.
1,2,4-Trimethylbenzene	28 / 180	0.002	107	A12-3-10	0.0018	**2.69**	0.051	**YES**	Maximum detect exceeds screening value.
1,2-Dibromoethane	0 / 180	ND	ND	ND	**0.0018**	**20.9**	0.000043	No	Constituent not detected.
1,2-Dichlorobenzene	5 / 180	0.0019	0.099599998	NBJ-1-5	0.0018	**20.9**	0.65	No	Maximum detect below screening value.
1,2-Dichloroethane	1 / 180	0.0018	0.0018	A10-2-INT	**0.0018**	**20.9**	0.001	**YES**	Maximum detect exceeds screening value.
1,2-Dichloroethene, Total	5 / 27	0.0034	0.020200001	SEBJ-5-15	0.0028	**20.9**	0.089	No	Maximum detect below screening value.
1,2-Dichloropropane	0 / 180	ND	ND	ND	0.0018	**20.9**	0.0031	No	Constituent not detected.
1,3,5-Trimethylbenzene	21 / 180	0.0011	51.3	A12-3-10	0.0018	**2.69**	0.29	**YES**	Maximum detect exceeds screening value.
1,3-Dichlorobenzene	0 / 180	ND	ND	ND	0.0018	20.9	NA	No	Constituent not detected.
1,3-Dichloropropane	0 / 180	ND	ND	ND	0.0018	**20.9**	0.24	No	Constituent not detected.
1,4-Dichlorobenzene	1 / 180	0.0014	0.0014	NBJ-1-5	0.0018	**20.9**	0.0096	No	Maximum detect below screening value.
1,4-Dioxane	1 / 153	0.171	0.2	JC-14-2	**0.074**	**90**	0.0034	**YES**	Maximum detect exceeds screening value.
2,2-Dichloropropane	0 / 180	ND	ND	ND	0.0018	20.9	NA	No	Constituent not detected.
2-Butanone	14 / 180	0.005	0.105	A12-8-15	0.0056	**41.8**	2.41	No	Maximum detect below screening value.
2-Chloroethyl vinyl ether	0 / 148	ND	ND	ND	0.0092	11	NA	No	Constituent not detected.
2-Chlorotoluene	0 / 180	ND	ND	ND	0.0018	**20.9**	0.41	No	Constituent not detected.
2-Hexanone (methyl butyl ketone)	2 / 180	0.0087	0.055599998	A12-8-15	0.0092	**83.6**	0.019	**YES**	Maximum detect exceeds screening value.
3-Chloro-1,2-dibromopropane	0 / 27	ND	ND	ND	**0.0056**	**41.8**	0.0000034	No	Constituent not detected.
4-Chlorotoluene	0 / 180	ND	ND	ND	0.0018	**20.9**	0.43	No	Constituent not detected.
4-Isopropyltoluene [2]	11 / 180	0.0012	3.61	A12-3-10	0.0018	**20.9**	1.54	**YES**	Maximum detect exceeds screening value.
4-Methyl-2-pentanone	4 / 180	0.0255	6.29	S22-2-5	0.0056	**41.8**	0.55	**YES**	Maximum detect exceeds screening value.
Acetone	59 / 180	0.011	0.784	S22-1-0.5	0.0112	**83.6**	5.78	No	Maximum detect below screening value.
Acrolein	0 / 153	ND	ND	ND	**0.0092**	**11**	0.00002	No	Constituent not detected.
Acrylonitrile	0 / 153	ND	ND	ND	**0.0092**	**11**	0.00024	No	Constituent not detected.
Benzene	3 / 180	0.0012	0.0144	S22-2-0.5	0.0018	**20.9**	0.0048	**YES**	Maximum detect exceeds screening value.
Bromobenzene	0 / 180	ND	ND	ND	0.0018	**20.9**	0.087	No	Constituent not detected.
Bromochloromethane	0 / 180	ND	ND	ND	0.0018	**20.9**	0.051	No	Constituent not detected.
Bromodichloromethane	0 / 180	ND	ND	ND	**0.0018**	**20.9**	0.00077	No	Constituent not detected.

TABLE 2-11
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Volatile Organics (continued)									
Bromoform	0 / 180	ND	ND	ND	0.0018	**20.9**	0.051	No	Constituent not detected.
Bromomethane	0 / 180	ND	ND	ND	0.0018	**20.9**	0.0043	No	Constituent not detected.
Carbon Disulfide	6 / 179	0.0024	0.0053	S22-2-INT	0.0018	**20.9**	0.51	No	Maximum detect below screening value.
Carbon Tetrachloride	0 / 180	ND	ND	ND	0.0018	**20.9**	0.0036	No	Constituent not detected.
Chlorobenzene	0 / 180	ND	ND	ND	0.0018	**20.9**	0.12	No	Constituent not detected.
Dibromochloromethane	0 / 180	ND	ND	ND	**0.0018**	**20.9**	0.00094	No	Constituent not detected.
Chloroethane	0 / 180	ND	ND	ND	0.0018	**20.9**	14.2	No	Constituent not detected.
Chloroform	0 / 180	ND	ND	ND	**0.0018**	**20.9**	0.0013	No	Constituent not detected.
Chloromethane	0 / 180	ND	ND	ND	0.0018	**20.9**	0.12	No	Constituent not detected.
Cis-1,2-Dichloroethene	62 / 180	0.0018	57.3	A12-3-10	0.0025	**20.9**	0.020	**YES**	Maximum detect exceeds screening value.
Cis-1,3-Dichloropropene	0 / 180	ND	ND	ND	0.0018	20.9	NA	No	Constituent not detected.
Dibromomethane	0 / 180	ND	ND	ND	0.0018	**20.9**	0.0046	No	Constituent not detected.
Dichlorodifluoromethane	0 / 180	ND	ND	ND	0.0018	**20.9**	0.72	No	Constituent not detected.
Ethylbenzene	27 / 180	0.0016	881	A12-3-10	0.0018	0.0086	0.036	**YES**	Maximum detect exceeds screening value.
Hexachlorobutadiene	0 / 180	ND	ND	ND	0.0018	**20.9**	0.012	No	Constituent not detected.
Isopropylbenzene	23 / 180	0.001	29.8	A12-3-10	0.0018	**20.9**	1.54	**YES**	Maximum detect exceeds screening value.
m,p-Xylenes [3]	24 / 153	0.0031	3550	A12-3-10	0.0037	0.017	0.43	**YES**	Maximum detect exceeds screening value.
Methyl tert-butyl ether	0 / 170	ND	ND	ND	0.0025	**20.9**	0.067	No	Constituent not detected.
Methylene chloride	0 / 180	ND	ND	ND	0.0028	**20.9**	0.053	No	Constituent not detected.
Naphthalene	16 / 180	0.0034	4.96	A12-3-10	0.0018	**41.8**	0.011	**YES**	Maximum detect exceeds screening value.
N-Butylbenzene	18 / 180	0.0014	4.24	A12-3-10	0.0018	**20.9**	6.025	No	Maximum detect below screening value.
N-Propylbenzene	24 / 180	0.0014	34	A12-3-10	0.0018	**20.9**	2.39	**YES**	Maximum detect exceeds screening value.
o-Xylene	23 / 153	0.001	1090	A12-3-10	0.0018	0.0086	0.46	**YES**	Maximum detect exceeds screening value.
Sec-Butylbenzene	18 / 180	0.0012	69.800	A12-8-10	0.0018	2.69	11.1	**YES**	Maximum detect exceeds screening value.
Styrene	1 / 180	13.2	13.2	A12-3-10	0.0018	**20.9**	2.89	**YES**	Maximum detect exceeds screening value.
Tert-Butylbenzene	5 / 180	0.0019	0.147	A12-3-2	0.0018	**20.9**	2.65	No	Maximum detect below screening value.
Tetrachloroethene	109 / 180	0.00082	277	A12-3-10	0.0028	**20.9**	0.039	**YES**	Maximum detect exceeds screening value.
Toluene	30 / 180	0.0014	1130	A12-3-10	0.0018	0.258	1.42	**YES**	Maximum detect exceeds screening value.
Total Xylenes	34 / 180	0.001	4640	A12-3-10	0.0028	0.017	0.46	**YES**	Maximum detect exceeds screening value.
Trans-1,2-Dichloroethene	10 / 180	0.00066	0.0067	NBJ-1-5	0.0018	**20.9**	0.060	No	Maximum detect below screening value.
Trans-1,3-Dichloropropene	0 / 180	ND	ND	ND	0.0018	20.9	NA	No	Constituent not detected.
Trichloroethene	58 / 180	0.00095	28.2	A12-3-10	**0.0027**	**20.9**	0.0022	**YES**	Maximum detect exceeds screening value.
Trichlorofluoromethane	0 / 180	ND	ND	ND	0.0018	**20.9**	1.66	No	Constituent not detected.
Vinyl Acetate	0 / 153	ND	ND	ND	0.0092	**11**	0.21	No	Constituent not detected.
Vinyl Chloride	19 / 180	0.0013	2.16	NBJ-1-5	**0.0018**	**20.9**	0.00013	**YES**	Maximum detect exceeds screening value.
Dibromochloropropane (DBCP)	0 / 153	ND	ND	ND	0.0018	2.3	NA	No	Constituent not detected.

TABLE 2-11
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
VOCs - Method 3810 Mod									
Benzene	2 / 97	0.137	0.147	A12-8-10	**0.0084**	**0.0084**	0.0048	**YES**	Maximum detect exceeds screening value.
Cis-1,2-Dichloroethene	29 / 97	0.005	0.403	SEBJ-9-20	0.0084	0.0084	0.02	**YES**	Maximum detect exceeds screening value.
Ethylbenzene	5 / 97	0.0315	22.1	A12-8-10	0.0084	0.0084	0.036	**YES**	Maximum detect exceeds screening value.
Tetrachloroethene	59 / 97	0.0085	1.008	A12-8-10	0.0084	0.0084	0.039	**YES**	Maximum detect exceeds screening value.
Toluene	5 / 97	0.0231	57.414	A12-8-10	0.0084	0.0084	1.42	**YES**	Maximum detect exceeds screening value.
Trichloroethene	27 / 97	0.0058	0.069300003	SEBJ-8-15	**0.0084**	**0.0084**	0.0022	**YES**	Maximum detect exceeds screening value.
Total Xylenes	7 / 97	0.137	96.6	A12-8-10	0.0084	0.0084	0.46	**YES**	Maximum detect exceeds screening value.
Semi-Volatile Organics									
1,2,4-Trichlorobenzene	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.027	No	Constituent not detected.
1,2-Dichlorobenzene	0 / 35	ND	ND	ND	0.16	0.22	0.65	No	Constituent not detected.
1,2-Diphenylhydrazine	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.0053	No	Constituent not detected.
1,3-Dichlorobenzene	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
1,4-Dichlorobenzene	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.0096	No	Constituent not detected.
1-Methylnaphthalene	1 / 35	0.075	0.075	S25-2-0.5	**0.16**	**0.22**	0.12	No	Maximum detect below screening value.
2,4,5-Trichlorophenol	0 / 35	ND	ND	ND	0.16	0.22	7.95	No	Constituent not detected.
2,4,6-Trichlorophenol	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.082	No	Constituent not detected.
2,4-Dichlorophenol	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.099	No	Constituent not detected.
2,4-Dimethylphenol	0 / 35	ND	ND	ND	0.16	0.22	0.77	No	Constituent not detected.
2,4-Dinitrophenol	0 / 35	ND	ND	ND	**0.82**	**1.1**	0.082	No	Constituent not detected.
2,4-Dinitrotoluene	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.0067	No	Constituent not detected.
2,6-Dinitrotoluene	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.0014	No	Constituent not detected.
2-Chloronaphthalene	0 / 35	ND	ND	ND	0.16	0.22	6.99	No	Constituent not detected.
2-Chlorophenol	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.14	No	Constituent not detected.
2-Methylnaphthalene	2 / 35	0.028	0.086599998	S25-2-0.5	0.16	0.22	0.34	No	Maximum detect below screening value.
2-Methylphenol	0 / 35	ND	ND	ND	0.16	0.22	1.40	No	Constituent not detected.
2-Nitroaniline	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.15	No	Constituent not detected.
2-Nitrophenol	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
3,3'-Dichlorobenzidine	0 / 33	ND	ND	ND	**0.16**	**0.22**	0.017	No	Constituent not detected.
3-Nitroaniline	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
4,6-Dinitro-2-methylphenol	0 / 35	ND	ND	ND	**0.33**	**0.44**	0.0048	No	Constituent not detected.
4-Bromophenyl phenyl ether	0 / 33	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
4-Chloro-3-Methylphenol	0 / 35	ND	ND	ND	0.16	0.22	3.13	No	Constituent not detected.
4-Chloroaniline	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.0031	No	Constituent not detected.
4-Chlorophenyl phenyl ether	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
4-Nitroaniline	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.034	No	Constituent not detected.
4-Nitrophenol	0 / 33	ND	ND	ND	0.82	1.1	NA	No	Constituent not detected.
Acenaphthene	0 / 35	ND	ND	ND	0.16	0.22	9.88	No	Constituent not detected.

TABLE 2-11
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
Acenaphthylene	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
Aniline	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.089	No	Constituent not detected.
Anthracene	1 / 35	0.057	0.057	S25-2-0.5	0.16	0.22	101	No	Maximum detect below screening value.
Benzidine	0 / 35	ND	ND	ND	**1.6**	**2.2**	0.0000058	No	Constituent not detected.
Benzo(a)anthracene	3 / 35	0.029	0.161	S25-2-0.5	0.16	0.21	0.24	No	Maximum detect below screening value.
Benzo(a)pyrene	2 / 35	0.046	0.141	S25-2-0.5	**0.16**	**0.22**	0.084	**YES**	Maximum detect exceeds screening value.
Benzo(b)fluoranthene	3 / 35	0.049	0.146	S25-2-0.5	0.16	0.21	0.84	No	Maximum detect below screening value.
Benzo(g,h,i)perylene [4]	3 / 35	0.041	0.171	S25-2-0.5	0.16	0.21	22.9	No	Maximum detect below screening value.
Benzo(k)fluoranthene	1 / 35	0.097	0.097	S25-2-0.5	0.16	0.22	8.44	No	Maximum detect below screening value.
Benzoic Acid	0 / 35	ND	ND	ND	0.82	1.1	33.7	No	Constituent not detected.
Benzyl Alcohol	1 / 35	0.579	0.579	JC-3-0.5	0.16	0.22	0.89	No	Maximum detect below screening value.
Bis(2-Chloroethoxy)methane	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.027	No	Constituent not detected.
Bis(2-Chloroethyl)ether	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.000075	No	Constituent not detected.
Bis(2-Chloroisopropyl)ether	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.0027	No	Constituent not detected.
Bis(2-Ethylhexyl) phthalate	1 / 35	0.612	0.612	A11-1-0.5	0.33	0.44	26.5	No	Maximum detect below screening value.
Butyl benzyl phthalate	1 / 35	0.901	0.901	A11-1-0.5	0.16	0.22	4.82	No	Maximum detect below screening value.
Carbazole	1 / 35	0.027	0.027	S25-2-0.5	0.16	0.22	NA	No	Screening value not available.
Chrysene	3 / 35	0.030	0.252	S25-2-0.5	0.16	0.21	26.5	No	Maximum detect below screening value.
Dibenz(a,h)anthracene	1 / 35	0.037	0.037	S25-2-0.5	0.16	0.22	0.27	No	Maximum detect below screening value.
Dibenzofuran	1 / 35	0.033	0.033	S25-2-0.5	0.16	0.22	0.27	No	Maximum detect below screening value.
Diethyl Phthalate	0 / 35	ND	ND	ND	0.33	0.44	11.3	No	Constituent not detected.
Dimethyl Phthalate	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
Di-N-butyl phthalate	0 / 35	ND	ND	ND	0.33	0.44	4.097	No	Constituent not detected.
Di-N-octyl phthalate	0 / 35	ND	ND	ND	0.16	0.22	106	No	Constituent not detected.
Fluoranthene	3 / 35	0.042	0.243	S25-2-0.5	0.16	0.21	169	No	Maximum detect below screening value.
Fluorene	0 / 35	ND	ND	ND	0.16	0.22	9.64	No	Constituent not detected.
Hexachloro-1,3-cyclopentadiene	0 / 35	ND	ND	ND	0.16	**0.22**	0.17	No	Constituent not detected.
Hexachlorobenzene	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.013	No	Constituent not detected.
Hexachlorobutadiene	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.012	No	Constituent not detected.
Hexachloroethane	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.0075	No	Constituent not detected.
Indeno(1,2,3-cd)pyrene	3 / 35	0.032	0.11	S25-2-0.5	0.16	0.21	4.82	No	Maximum detect below screening value.
Isophorone	0 / 35	ND	ND	ND	0.16	0.22	0.53	No	Constituent not detected.
m-,p-Cresol mixture	0 / 35	ND	ND	ND	0.16	0.22	NA	No	Constituent not detected.
Naphthalene	2 / 35	0.025	0.042	S25-2-0.5	**0.16**	**0.21**	0.011	**YES**	Maximum detect exceeds screening value.
Nitrobenzene	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.0019	No	Constituent not detected.
N-Nitrosodimethylamine	0 / 35	ND	ND	ND	**0.33**	**0.44**	0.0000024	No	Constituent not detected.
N-Nitrosodi-N-propylamine	0 / 35	ND	ND	ND	**0.16**	**0.22**	0.00017	No	Constituent not detected.

TABLE 2-11
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
N-Nitrosodiphenylamine	0 / 35	ND	ND	ND	0.16	0.22	1.37	No	Constituent not detected.
Pentachlorophenol	0 / 35	ND	ND	ND	**0.82**	**1.1**	0.0087	No	Constituent not detected.
Phenanthrene [5]	3 / 35	0.0314	0.367	S25-2-0.5	0.16	0.21	101	No	Maximum detect below screening value.
Phenol	0 / 35	ND	ND	ND	0.16	0.22	6.27	No	Constituent not detected.
Pyrene	3 / 35	0.036099998	0.326	S25-2-0.5	0.16	0.21	22.9	No	Maximum detect below screening value.
Pyridine	0 / 35	ND	ND	ND	**0.33**	**0.44**	0.013	No	Constituent not detected.
PCBs									
Aroclor-1016	0 / 27	ND	ND	ND	0.016	0.021	0.24	No	Constituent not detected.
Aroclor-1221	0 / 27	ND	ND	ND	**0.016**	**0.021**	0.0017	No	Constituent not detected.
Aroclor-1232	0 / 27	ND	ND	ND	**0.016**	**0.021**	0.0017	No	Constituent not detected.
Aroclor-1242	0 / 27	ND	ND	ND	0.016	0.021	0.13	No	Constituent not detected.
Aroclor-1248	0 / 27	ND	ND	ND	0.016	0.021	0.13	No	Constituent not detected.
Aroclor-1254	3 / 27	0.008	0.095	JC-7-0.5	0.016	0.021	0.20	No	Maximum detect below screening value.
Aroclor-1260	0 / 27	ND	ND	ND	0.016	0.021	0.58	No	Constituent not detected.
Total Petroleum Hydrocarbons (TPH)									
DRO (C10-C28) Range	3 / 29	3.32	8.44	JC-6-2	8.2	12	NA	No	Evaluated through individual constituents including BTEX and naphthalene.
Herbicides/Pesticides									
2,4,5-T	14 / 28	0.008	0.0184	JC-9-0.5	0.033	0.049	0.13	No	Maximum detect below screening value.
2,4-D	0 / 28	ND	ND	ND	**0.33**	**0.49**	0.084	No	Constituent not detected.
2,4-Db	0 / 28	ND	ND	ND	**0.33**	**0.49**	0.087	No	Constituent not detected.
4,4'-DDD	0 / 29	ND	ND	ND	0.0033	0.0042	0.15	No	Constituent not detected.
4,4'-DDE	0 / 29	ND	ND	ND	0.0033	0.0042	1.11	No	Constituent not detected.
4,4'-DDT	0 / 29	ND	ND	ND	0.0033	0.0042	1.61	No	Constituent not detected.
Aldrin	0 / 29	ND	ND	ND	0.0016	0.0021	0.016	No	Constituent not detected.
Alpha-BHC	0 / 29	ND	ND	ND	**0.0016**	**0.0021**	0.00087	No	Constituent not detected.
Beta-BHC	0 / 29	ND	ND	ND	0.0016	0.0021	0.0031	No	Constituent not detected.
Delta-BHC	0 / 29	ND	ND	ND	0.0016	0.0021	NA	No	Constituent not detected.
Alpha-Chlordane	0 / 29	ND	ND	ND	0.0016	0.0021	NA	No	Constituent not detected.
Dalapon	6 / 28	0.48	0.71	JC-3-2	**1.6**	**2.5**	0.23	**YES**	Maximum detect exceeds screening value.
Dicamba	0 / 28	ND	ND	ND	0.033	0.049	0.27	No	Constituent not detected.
Dichoroprop	0 / 28	ND	ND	ND	0.33	0.49	NA	No	Constituent not detected.
Dieldrin	0 / 29	ND	ND	ND	**0.0016**	**0.0021**	0.0015	No	Constituent not detected.
Dinoseb	0 / 20	ND	ND	ND	**0.82**	**1**	0.24	No	Constituent not detected.
Endosulfan I	0 / 29	ND	ND	ND	0.0016	0.0021	NA	No	Constituent not detected.
Endosulfan II	0 / 29	ND	ND	ND	0.0016	0.0021	NA	No	Constituent not detected.
Endosulfan sulfate	0 / 29	ND	ND	ND	0.0033	0.0042	NA	No	Constituent not detected.
Endrin	0 / 29	ND	ND	ND	0.0033	0.0042	0.16	No	Constituent not detected.

TABLE 2-11
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Herbicides/Pesticides (continued)									
Endrin aldehyde	0 / 29	ND	ND	ND	0.0033	0.0042	NA	No	Constituent not detected.
Endrin ketone	0 / 29	ND	ND	ND	0.0033	0.0042	NA	No	Constituent not detected.
Gamma-BHC	0 / 29	ND	ND	ND	0.0016	0.0021	0.0051	No	Constituent not detected.
Gamma-Chlordane	0 / 29	ND	ND	ND	0.0016	0.0021	NA	No	Constituent not detected.
Heptachlor	0 / 29	ND	ND	ND	0.0016	0.0021	0.0034	No	Constituent not detected.
Heptachlor epoxide	0 / 29	ND	ND	ND	0.0016	**0.0021**	0.0016	No	Constituent not detected.
Mcpa	0 / 28	ND	ND	ND	**33**	**49**	0.0036	No	Constituent not detected.
Mcpp	0 / 28	ND	ND	ND	**33**	**49**	0.0084	No	Constituent not detected.
Methoxychlor	0 / 29	ND	ND	ND	0.0033	0.0042	3.62	No	Constituent not detected.
Pentachlorophenol	0 / 28	ND	ND	ND	**0.033**	**0.049**	0.0087	No	Constituent not detected.
Silvex (2,4,5-TP)	0 / 28	ND	ND	ND	0.033	0.049	0.11	No	Constituent not detected.
Toxaphene	0 / 29	ND	ND	ND	**0.082**	**0.1**	0.05061	No	Constituent not detected.
Total Metals									
Aluminum	30 / 30	779	10400	JC-5-5	--	--	55430	No	Maximum detect below screening value.
Antimony	0 / 30	ND	ND	ND	**0.8**	**6**	0.6507	No	Constituent not detected.
Arsenic	42 / 68	0.94	43.200001	A10-3-2	**1.6**	**7.6**	0.031	**YES**	Maximum detect exceeds screening value.
Barium	42 / 68	14.3	1730	A10-4-5	32	60	289	**YES**	Maximum detect exceeds screening value.
Beryllium	0 / 30	ND	ND	ND	0.2	1.5	31.33	No	Constituent not detected.
Boron	0 / 2	ND	ND	ND	9.4	10	23.859	No	Constituent not detected.
Cadmium	15 / 68	0.4	16.6	A10-4-2	0.15	1.2	1.25	**YES**	Maximum detect exceeds screening value.
Calcium	27 / 31	1100	5010	T6-2-20	970	1300	NA	No	Essential Nutrient.
Chromium [6]	48 / 68	1.3	197	A10-2-0.5	1.7	2.5	57840000	No	Maximum detect below screening value.
Cobalt	1 / 30	10.4	10.4	JC-13-0.5	**2**	**15**	0.51	**YES**	Maximum detect exceeds screening value.
Copper	4 / 30	2.2	9.7	JC-5-5	2.4	7.5	53.0	No	Maximum detect below screening value.
Iron	31 / 31	1610	21800	T6-2-20	--	--	651	**YES**	Maximum detect exceeds screening value.
Lead	56 / 77	2.1	4970	A10-4-5	3.2	5.1	NA	No	Screening value not available.
Lithium	0 / 2	ND	ND	ND	**470**	**520**	22.4	No	Constituent not detected.
Manganese	33 / 33	22.1	680	T6-2-15	--	--	50.6	**YES**	Maximum detect exceeds screening value.
Magnesium	7 / 33	448	7400	T6-2-20	470	1300	NA	No	Essential Nutrient.
Mercury	15 / 68	0.062	3.5	A10-4-2	0.037	0.055	0.08	**YES**	Maximum detect exceeds screening value.
Molybdenum	0 / 30	ND	ND	ND	2	**15**	3.86	No	Constituent not detected.
Nickel	2 / 30	3.4	13.0	JC-5-5	3.5	12	48.2	No	Maximum detect below screening value.
Potassium	2 / 31	2580	3910	T6-2-20	440	3000	NA	No	Essential Nutrient.
Selenium	2 / 68	0.71	4.2	JC-10-2	0.74	**15**	0.96	**YES**	Maximum detect exceeds screening value.
Silver	2 / 68	1.8	3.1	A10-4-15	0.35	**7.6**	1.45	**YES**	Maximum detect exceeds screening value.
Sodium	0 / 32	ND	ND	ND	400	3000	NA	No	Constituent not detected.

TABLE 2-11
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL - EASTERN AREA - MIGRATION TO GROUNDWATER
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Concentration (mg/kg)	Maximum Detected Soil Concentration (mg/kg)	Sample with Maximum Detect	Minimum Detection Limit (mg/kg)	Maximum Detection Limit (mg/kg)	Risk-Based Soil Screening Level [1] (mg/kg)	Constituent of Interest	Comment
Total Metals (continued)									
Strontium (Total)	30 / 30	5.7	53.200001	JC-5-5	--	--	795	No	Maximum detect below screening value.
Thallium	0 / 30	ND	ND	ND	**0.4**	**9**	0.027	No	Constituent not detected.
Tin	0 / 30	ND	ND	ND	2	15	5543	No	Constituent not detected.
Titanium [7]	30 / 30	31.799999	104	JC-5-0.5	--	--	1.42	**YES**	Maximum detect exceeds screening value.
Vanadium	5 / 30	6.6	25.4	JC-5-0.5	7.9	13	152	No	Maximum detect below screening value.
Zinc	30 / 30	6.0	28.6	JC-5-0.5	--	--	699	No	Maximum detect below screening value.

Notes:
ND - Not Detected
NA - Not Available
"--" - Constituent detected in every sample; detection limit not presented.
[1] Risk-Based Soil Screening Levels (SSLs) for protection of groundwater from USEPA (2013a) based on a site specific DAF of 24.1. Non-cancer based screening levels reflect a hazard quotient of 0.1.
[2] The SSL for 4-isopropyltoluene is based on the SSL for isopropylbenzene.
[3] The SSL for m,p-xylenes is conservatively based on the SSL for m-xylene.
[4] The SSL for benzo(g,h,i)perylene is based on the SSL for pyrene.
[5] The SSL for phenanthrene is based on the SSL for anthracene.
[6] Site-specific SSL for total chromium is based on the assumption that hexavalent and trivalent chromium are present at a ratio of 1:6 (Cr IV to Cr III). See text Section 2.4.1.
[7] The SSL for titanium is based on the SSL for titanium tetrachloride.
Bold detection limits indicates the value exceeds the RSL.

TABLE 2-12
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN ONSITE AND DOWNGRADIENT GROUNDWATER - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	USEPA Tapwater RSL [1] (µg/L)	Constituent of Interest	Comment
Volatile Organics									
1,1,1,2-Tetrachloroethane	0 / 170	ND	ND	ND	**1**	**20**	0.5	No	Constituent not detected.
1,1,1-Trichloroethane	60 / 169	0.3	117	T8-4 (10/4/13)	1	5	750	No	Maximum detect below screening value.
1,1,2,2-Tetrachloroethane	0 / 170	ND	ND	ND	**1**	**20**	0.066	No	Constituent not detected.
1,1,2-Trichloroethane	0 / 170	ND	ND	ND	**1**	**20**	0.041	No	Constituent not detected.
1,1-Dichloroethane	50 / 169	0.23	108	T7-2 (10/1/2013)	1	1	2.4	**YES**	Maximum detect exceeds screening value.
1,1-Dichloroethene	53 / 168	0.21	8.5	DC-3 (10/16/2013)	1	20	26	No	Maximum detect below screening value.
1,1-Dichloropropene	0 / 170	ND	ND	ND	1	20	NA	No	Constituent not detected.
1,2,3-Trichlorobenzene	0 / 170	ND	ND	ND	**1**	**20**	0.52	No	Constituent not detected.
1,2,3-Trichloropropane	0 / 170	ND	ND	ND	**1**	**40**	0.00065	No	Constituent not detected.
1,2,4-Trichlorobenzene	0 / 170	ND	ND	ND	**1**	**20**	0.39	No	Constituent not detected.
1,2,4-Trimethylbenzene	9 / 170	0.22	1985	T8-1 (10/4/13)	1	**40**	1.5	**YES**	Maximum detect exceeds screening value.
1,2-Dibromoethane	0 / 170	ND	ND	ND	**1**	**20**	0.0065	No	Constituent not detected.
1,2-Dichlorobenzene	0 / 170	ND	ND	ND	1	20	28	No	Constituent not detected.
1,2-Dichloroethane	1 / 170	0.48	0.48	T7-2 (10/1/2013)	**1**	**20**	0.15	**YES**	Maximum detect exceeds screening value.
1,2-Dichloropropane	0 / 170	ND	ND	ND	**1**	**20**	0.38	No	Constituent not detected.
1,3,5-Trimethylbenzene	7 / 170	0.4	512	T8-1 (10/4/13)	1	**40**	8.7	**YES**	Maximum detect exceeds screening value.
1,3-Dichlorobenzene	0 / 170	ND	ND	ND	1	20	NA	No	Constituent not detected.
1,3-Dichloropropane	0 / 170	ND	ND	ND	1	20	29	No	Constituent not detected.
1,4-Dichlorobenzene	0 / 170	ND	ND	ND	**1**	**20**	0.42	No	Constituent not detected.
1,4-Dioxane	0 / 109	ND	ND	ND	**200**	**4000**	0.67	No	Constituent not detected.
2,2-Dichloropropane	0 / 170	ND	ND	ND	1	20	NA	No	Constituent not detected.
2-Butanone	0 / 110	ND	ND	ND	5	100	490	No	Constituent not detected.
2-Chloroethyl Vinyl Ether	0 / 92	ND	ND	ND	5	100	NA	No	Constituent not detected.
2-Chlorotoluene	0 / 170	ND	ND	ND	1	**20**	18	No	Constituent not detected.
2-Hexanone (methyl butyl ketone)	0 / 170	ND	ND	ND	**10**	**200**	3.4	No	Constituent not detected.
4-Chlorotoluene	0 / 170	ND	ND	ND	1	**20**	19	No	Constituent not detected.
4-Isopropyltoluene [2]	2 / 170	0.22	5.05	T8-1 (10/4/13)	1	20	39	No	Maximum detect below screening value.
4-Methyl-2-Pentanone	2 / 110	2.95	9.6	T8-0 (10/4/13)	5	100	100	No	Maximum detect below screening value.
Acetone	5 / 110	12.7	236	T8-1 (10/4/13)	10	500	1200	No	Maximum detect below screening value.
Acrolein	0 / 109	ND	ND	ND	**20**	**400**	0.0041	No	Constituent not detected.
Acrylonitrile	0 / 109	ND	ND	ND	**10**	**200**	0.045	No	Constituent not detected.
Benzene	31 / 169	0.23	2.15	T8-5 (10/4/13)	**1**	**20**	0.39	**YES**	Maximum detect exceeds screening value.

TABLE 2-12
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN ONSITE AND DOWNGRADIENT GROUNDWATER - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	USEPA Tapwater RSL [1] (µg/L)	Constituent of Interest	Comment
Volatile Organics (continued)									
Bromobenzene	0 / 170	ND	ND	ND	1	**20**	5.4	No	Constituent not detected.
Bromochloromethane	0 / 170	ND	ND	ND	1	**20**	8.3	No	Constituent not detected.
Bromodichloromethane	0 / 170	ND	ND	ND	**1**	**20**	0.12	No	Constituent not detected.
Bromoform	0 / 170	ND	ND	ND	1	**20**	7.9	No	Constituent not detected.
Bromomethane	0 / 170	ND	ND	ND	**1**	**40**	0.7	No	Constituent not detected.
Carbon Disulfide	7 / 110	0.58	6.6	JC-5 (10/18/2013)	2	40	72	No	Maximum detect below screening value.
Carbon Tetrachloride	0 / 167	ND	ND	ND	**1**	**20**	0.39	No	Constituent not detected.
Chlorobenzene	2 / 170	0.3	0.3	SK-3S (10/20/2013)	1	**20**	7.2	No	Maximum detect below screening value.
Dibromochloromethane	0 / 170	ND	ND	ND	**1**	**20**	0.15	No	Constituent not detected.
Dibromochloropropane (DBCP)	0 / 169	ND	ND	ND	2	40	NA	No	Constituent not detected.
Chloroethane	1 / 170	0.7	0.7	T8-5 (10/4/13)	1	40	2100	No	Maximum detect below screening value.
Chloroform	13 / 168	0.28	1.5	SK-3S (4/19/2012)	**1**	**20**	0.19	**YES**	Maximum detect exceeds screening value.
Chloromethane	3 / 170	0.51	0.555	T8-5 (10/4/13)	1	**40**	19	No	Maximum detect below screening value.
Cis-1,2-Dichloroethene	160 / 170	0.27	1710	DC-3 (10/16/2013)	1	1	2.8	**YES**	Maximum detect exceeds screening value.
Cis-1,3-Dichloropropene	0 / 110	ND	ND	ND	1	20	NA	No	Constituent not detected.
Dibromomethane	0 / 170	ND	ND	ND	**1**	**40**	0.79	No	Constituent not detected.
Dichlorodifluoromethane	0 / 170	ND	ND	ND	1	**40**	19	No	Constituent not detected.
Ethylbenzene	11 / 170	0.31	1980	T8-1 (10/4/13)	1	**5**	1.3	**YES**	Maximum detect exceeds screening value.
Hexachlorobutadiene	0 / 170	ND	ND	ND	**1**	**40**	0.26	No	Constituent not detected.
Isopropylbenzene	7 / 170	0.36	102.5	T8-1 (10/4/13)	1	20	39	**YES**	Maximum detect exceeds screening value.
m,p-Xylenes	16 / 169	0.35	3840	T8-1 (10/4/13)	2	10	19	**YES**	Maximum detect exceeds screening value.
Methyl Tert-Butyl Ether	2 / 110	0.34	5.8	T8-5 (10/4/13)	1	**20**	12	No	Maximum detect below screening value.
Methylene Chloride	2 / 170	4.1	13.1	SK-2S (10/20/2013)	1	**100**	8.4	**YES**	Maximum detect exceeds screening value.
Naphthalene	3 / 170	1	346	T8-1 (10/4/13)	**3**	**60**	0.14	**YES**	Maximum detect exceeds screening value.
N-Butylbenzene	5 / 170	0.29	19.1	T8-1 (10/4/13)	1	20	78	No	Maximum detect below screening value.
N-Propylbenzene	8 / 169	0.31	345.5	T8-1 (10/4/13)	1	20	53	**YES**	Maximum detect exceeds screening value.
o-Xylene	16 / 169	0.27	485.5	T8-1 (10/4/13)	1	**20**	19	**YES**	Maximum detect exceeds screening value.
Sec-Butylbenzene	8 / 170	0.28	13.35	T8-1 (10/4/13)	1	20	160	No	Maximum detect below screening value.
Styrene	0 / 170	ND	ND	ND	1	20	110	No	Constituent not detected.
Tert-Butylbenzene	7 / 170	0.31	0.71	T8-2 (10/4/13)	1	20	51	No	Maximum detect below screening value.
Tetrachloroethene	136 / 170	0.365	724.5	SK-2S (4/18/2013)	1	**20**	3.5	**YES**	Maximum detect exceeds screening value.
Toluene	14 / 170	0.21	137.5	T8-1 (10/4/13)	1	5	86	**YES**	Maximum detect exceeds screening value.
Trans-1,2-Dichloroethene	35 / 170	0.25	7.2	SK-2S (4/18/2013)	1	**20**	8.6	No	Maximum detect below screening value.

TABLE 2-12
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN ONSITE AND DOWNGRADIENT GROUNDWATER - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	USEPA Tapwater RSL [1] (µg/L)	Constituent of Interest	Comment
Volatile Organics (continued)									
Trans-1,3-Dichloropropene	0 / 110	ND	ND	ND	1	20	NA	No	Constituent not detected.
Trichloroethene	148 / 170	0.35	219.5	SK-2S (4/18/2013)	**1**	**20**	0.26	**YES**	Maximum detect exceeds screening value.
Trichlorofluoromethane	4 / 169	0.65	1.2	SK-13S (10/19/2013)	1	40	110	No	Maximum detect below screening value.
Vinyl Acetate	0 / 109	ND	ND	ND	10	**200**	41	No	Constituent not detected.
Vinyl Chloride	35 / 170	0.45	102	T8-1 (10/4/13)	**1**	**5**	0.015	**YES**	Maximum detect exceeds screening value.
Total Xylenes	19 / 169	0.35	4405.25	T8-1 (10/4/13)	2	10	19	**YES**	Maximum detect exceeds screening value.
Semi-Volatile Organics									
1,2,4-Trichlorobenzene	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.39	No	Constituent not detected.
1,2-Dichlorobenzene	0 / 12	ND	ND	ND	4.7	5.3	28	No	Constituent not detected.
1,2-Diphenylhydrazine	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.067	No	Constituent not detected.
1,3-Dichlorobenzene	0 / 13	ND	ND	ND	4.7	5.3	NA	No	Constituent not detected.
1,4-Dichlorobenzene	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.42	No	Constituent not detected.
1,4-Dioxane	0 / 2	ND	ND	ND	**4.7**	**4.8**	0.67	No	Constituent not detected.
1-Methylnaphthalene	1 / 13	6.2	6.2	S1-1 (10/8/2013)	**4.7**	**5.3**	0.97	**YES**	Maximum detect exceeds screening value.
2,4,5-Trichlorophenol	0 / 13	ND	ND	ND	4.7	5.3	89	No	Constituent not detected.
2,4,6-Trichlorophenol	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.9	No	Constituent not detected.
2,4-Dichlorophenol	0 / 12	ND	ND	ND	**4.7**	**5.3**	3.5	No	Constituent not detected.
2,4-Dimethylphenol	0 / 13	ND	ND	ND	4.7	5.3	27	No	Constituent not detected.
2,4-Dinitrophenol	0 / 13	ND	ND	ND	**24**	**27**	3	No	Constituent not detected.
2,4-Dinitrotoluene	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.2	No	Constituent not detected.
2,6-Dinitrotoluene	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.042	No	Constituent not detected.
2-Chloronaphthalene	0 / 13	ND	ND	ND	4.7	5.3	55	No	Constituent not detected.
2-Chlorophenol	0 / 12	ND	ND	ND	4.7	5.3	7.1	No	Constituent not detected.
2-Methylnaphthalene	0 / 13	ND	ND	ND	**4.7**	**5.3**	2.7	No	Constituent not detected.
2-Methylphenol	0 / 13	ND	ND	ND	4.7	5.3	72	No	Constituent not detected.
2-Nitroaniline	0 / 13	ND	ND	ND	4.7	5.3	15	No	Constituent not detected.
2-Nitrophenol	0 / 13	ND	ND	ND	4.7	5.3	NA	No	Constituent not detected.
3,3'-Dichlorobenzidine	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.11	No	Constituent not detected.
3-Nitroaniline	0 / 13	ND	ND	ND	4.7	5.3	NA	No	Constituent not detected.
4,6-Dinitro-2-Methylphenol	0 / 13	ND	ND	ND	**9.4**	**11**	0.12	No	Constituent not detected.
4-Bromophenyl Phenyl Ether	0 / 9	ND	ND	ND	4.7	5.3	NA	No	Constituent not detected.
4-Chloro-3-Methylphenol	0 / 12	ND	ND	ND	4.7	5.3	110	No	Constituent not detected.

TABLE 2-12
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN ONSITE AND DOWNGRADIENT GROUNDWATER - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	USEPA Tapwater RSL [1] (µg/L)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
4-Chloroaniline	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.32	No	Constituent not detected.
4-Chlorophenyl Phenyl Ether	0 / 13	ND	ND	ND	4.7	5.3	NA	No	Constituent not detected.
4-Nitroaniline	0 / 13	ND	ND	ND	**4.7**	**5.3**	3.3	No	Constituent not detected.
4-Nitrophenol	0 / 13	ND	ND	ND	24	27	NA	No	Constituent not detected.
Acenaphthene	3 / 13	0.69	2.8	S1-1 (10/8/2013)	4.7	5.3	40	No	Maximum detect below screening value.
Acenaphthylene	0 / 13	ND	ND	ND	4.7	5.3	NA	No	Constituent not detected.
Aniline	0 / 13	ND	ND	ND	4.7	5.3	11	No	Constituent not detected.
Anthracene	0 / 13	ND	ND	ND	4.7	5.3	130	No	Constituent not detected.
Benzidine	0 / 13	ND	ND	ND	**24**	**27**	0.000092	No	Constituent not detected.
Benzo(A)Anthracene	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.029	No	Constituent not detected.
Benzo(A)Pyrene	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.0029	No	Constituent not detected.
Benzo(B)Fluoranthene	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.029	No	Constituent not detected.
Benzo(G,H,I)Perylene	0 / 13	ND	ND	ND	4.7	5.3	NA	No	Constituent not detected.
Benzo(K)Fluoranthene	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.29	No	Constituent not detected.
Benzoic Acid	0 / 13	ND	ND	ND	47	53	5800	No	Constituent not detected.
Benzyl Alcohol	0 / 12	ND	ND	ND	4.7	5.3	150	No	Constituent not detected.
Bis(2-Chloroethoxy)Methane	0 / 13	ND	ND	ND	**4.7**	**5.3**	4.6	No	Constituent not detected.
Bis(2-Chloroethyl)Ether	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.012	No	Constituent not detected.
Bis(2-Chloroisopropyl)Ether	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.31	No	Constituent not detected.
Bis(2-Ethylhexyl) Phthalate	0 / 13	ND	ND	ND	4.7	**5.3**	4.8	No	Constituent not detected.
Butyl Benzyl Phthalate	0 / 13	ND	ND	ND	4.7	5.3	14	No	Constituent not detected.
Carbazole	0 / 13	ND	ND	ND	4.7	5.3	NA	No	Constituent not detected.
Chrysene	0 / 13	ND	ND	ND	**4.7**	**5.3**	2.9	No	Constituent not detected.
Dibenz(A,H)Anthracene	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.0029	No	Constituent not detected.
Dibenzofuran	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.58	No	Constituent not detected.
Diethyl Phthalate	0 / 13	ND	ND	ND	4.7	5.3	1100	No	Constituent not detected.
Dimethyl Phthalate	0 / 13	ND	ND	ND	4.7	5.3	NA	No	Constituent not detected.
Di-N-Butyl Phthalate	0 / 13	ND	ND	ND	4.7	5.3	67	No	Constituent not detected.
Di-N-Octyl Phthalate	0 / 13	ND	ND	ND	4.7	5.3	16	No	Constituent not detected.
Fluoranthene	0 / 13	ND	ND	ND	4.7	5.3	63	No	Constituent not detected.
Fluorene	1 / 13	0.74	0.74	S1-1 (10/8/2013)	4.7	5.3	22	No	Maximum detect below screening value.
Hexachloro-1,3-Cyclopentadiene	0 / 13	ND	ND	ND	**4.7**	**5.3**	2.2	No	Constituent not detected.

TABLE 2-12
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN ONSITE AND DOWNGRADIENT GROUNDWATER - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	USEPA Tapwater RSL [1] (µg/L)	Constituent of Interest	Comment
Semi-Volatile Organics (continued)									
Hexachlorobenzene	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.042	No	Constituent not detected.
Hexachlorobutadiene	0 / 10	ND	ND	ND	**4.7**	**5.3**	0.26	No	Constituent not detected.
Hexachloroethane	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.51	No	Constituent not detected.
Indeno(1,2,3-Cd)Pyrene	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.029	No	Constituent not detected.
Isophorone	0 / 13	ND	ND	ND	4.7	5.3	67	No	Constituent not detected.
M-,P-Cresol Mixture	0 / 13	ND	ND	ND	4.7	5.3	140	No	Constituent not detected.
Naphthalene	0 / 10	ND	ND	ND	**4.7**	**5.3**	0.14	No	Constituent not detected.
Nitrobenzene	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.12	No	Constituent not detected.
N-Nitrosodimethylamine	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.00042	No	Constituent not detected.
N-Nitrosodi-N-Propylamine	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.0093	No	Constituent not detected.
N-Nitrosodiphenylamine	0 / 13	ND	ND	ND	4.7	5.3	10	No	Constituent not detected.
Pentachlorophenol	0 / 13	ND	ND	ND	**24**	**27**	0.035	No	Constituent not detected.
Phenanthrene	0 / 13	ND	ND	ND	4.7	5.3	NA	No	Constituent not detected.
Phenol	0 / 13	ND	ND	ND	4.7	5.3	450	No	Constituent not detected.
Pyrene	0 / 13	ND	ND	ND	4.7	5.3	8.7	No	Constituent not detected.
Pyridine	0 / 13	ND	ND	ND	**9.4**	**11**	1.5	No	Constituent not detected.
Total Petroleum Hydrocarbons									
DRO (C10-C28) Range	4 / 6	0.384	0.668	S11-3 (10/3/2013)	0.24	0.24	NA	No	Evaluated through individual constituents including BTEX and naphthalene.
Total Inorganics									
Arsenic	7 / 21	12.4	105	A10-4 (10/1/2013)	**10**	**10**	0.045	**YES**	Maximum detect exceeds screening value.
Barium	15 / 21	206	3540	A10-4 (10/1/2013)	200	200	290	**YES**	Maximum detect exceeds screening value.
Cadmium	0 / 21	ND	ND	ND	**5**	**10**	0.69	No	Constituent not detected.
Calcium	4 / 4	103000	165000	A10-4 (10/1/2013)	--	--	NA	No	Essential Nutrient.
Chromium [3]	12 / 21	12.1	343	A10-4 (10/1/2013)	10	10	1371	No	Maximum detect below screening value.
Iron	3 / 3	1720	311000	A10-4 (10/1/2013)	--	--	1100	**YES**	Maximum detect exceeds screening value.
Lead	15 / 21	5.4	762	A10-4 (10/1/2013)	5	5	15	**YES**	Maximum detect exceeds screening value.
Magnesium	4 / 4	33500	102000	A10-4 (10/1/2013)	--	--	NA	No	Essential Nutrient.
Manganese	3 / 3	1330	16100	A10-4 (10/1/2013)	--	--	32	**YES**	Maximum detect exceeds screening value.
Mercury	1 / 21	0.7	0.7	A10-4 (10/1/2013)	**0.5**	**0.5**	0.063	**YES**	Maximum detect exceeds screening value.
Potassium	2 / 3	11000	43100	A10-4 (10/1/2013)	10000	10000	NA	No	Essential Nutrient.
Selenium	0 / 21	ND	ND	ND	**10**	**20**	7.8	No	Constituent not detected.
Silver	0 / 21	ND	ND	ND	**10**	**20**	7.1	No	Constituent not detected.
Sodium	3 / 3	42800	49400	S18-4 (10/8/13)	--	--	NA	No	Essential Nutrient.

TABLE 2-12
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN ONSITE AND DOWNGRADIENT GROUNDWATER - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	USEPA Tapwater RSL [1] (µg/L)	Constituent of Interest	Comment
Dissolved Inorganics									
Arsenic	1 / 4	14	14	T6-2 (10/17/2013)	**10**	**10**	0.045	**YES**	Maximum detect exceeds screening value.
Barium	1 / 4	309	309	S11-1 (10/4/13)	200	200	290	**YES**	Maximum detect exceeds screening value.
Cadmium	0 / 4	ND	ND	ND	**5**	**5**	0.69	No	Constituent not detected.
Calcium	4 / 4	102000	123000	S11-1 (10/4/13)	--	--	NA	No	Essential Nutrient.
Chromium [3]	0 / 4	ND	ND	ND	10	10	1371	No	Constituent not detected.
Iron	1 / 4	3870	3870	T6-2 (10/17/2013)	5	5	1100	**YES**	Maximum detect exceeds screening value.
Lead	1 / 2	8.6	8.6	T6-2 (10/17/2013)	5	5	15	No	Maximum detect below screening value.
Magnesium	4 / 4	32800	38700	A10-4 (10/1/2013)	--	--	NA	No	Essential Nutrient.
Manganese	3 / 3	1350	3560	A10-4 (10/1/2013)	--	--	32	**YES**	Maximum detect exceeds screening value.
Mercury	0 / 4	ND	ND	ND	**0.5**	**0.5**	0.063	No	Constituent not detected.
Potassium	0 / 3	ND	ND	ND	10000	10000	NA	No	Constituent not detected.
Selenium	0 / 4	ND	ND	ND	**10**	**10**	7.8	No	Constituent not detected.
Silver	0 / 4	ND	ND	ND	**10**	**10**	7.1	No	Constituent not detected.
Sodium	3 / 3	46400	50300	S18-4 (10/8/13)	--	--	NA	No	Essential Nutrient.
Misc. Parameters									
Chloride [4]	3 / 3	32900.002	62400.002	S18-4 (10/8/13)	--	--	250000	No	Maximum detect below screening value.
Chloride (Dissolved) [4]	3 / 3	34500	67699.997	S18-4 (10/8/13)	--	--	250000	No	Maximum detect below screening value.
Fluoride	0 / 3	ND	ND	ND	**1000**	**1000**	62	No	Constituent not detected.
Nitrate as N	0 / 3	ND	ND	ND	500	500	2500	No	Constituent not detected.
Sulfate [4]	3 / 3	26000	138000	S18-4 (10/8/13)	--	--	250000	No	Maximum detect below screening value.
Sulfate (Dissolved) [4]	3 / 3	27600	142000	S18-4 (10/8/13)	--	--	250000	No	Maximum detect below screening value.
Sulfide [4]	1 / 3	0.48	0.48	T6-2 (10/17/2013)	1000	1000	250000	No	Maximum detect below screening value.

Notes:

Values in bold indicate detection limit exceeds screening level.

"- -" Constituent detected in every sample; detection limit not presented.

NA- Not Available

ND- Not Detected

[1] Screening levels are the USEPA Tapwater Regional Screening Level (RSL; USEPA, 2013a). Non-cancer based screening levels reflect a hazard quotient of 0.1.

[2] The RSL for 4-isopropyl toluene is based on the RSL for isopropylbenzene.

[3] Site-specific RSL for total chromium is based on the assumption that hexavalent and trivalent chromium are present at a ratio of 1:6 (Cr IV to Cr III). See text Section 2.4.2.

[4] Direct contact groundwater screening values are based on Secondary Drinking Water Regulations (USEPA, 2014a). The SDWR values are aesthetic thresholds, not risk-based concentrations.

TABLE 2-13
COMPARISON OF ONSITE AND DOWNGRADIENT GROUNDWATER DATA TO FEDERAL MCLs
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	Federal MCL [1] (ug/L)	Constituent Exceeds MCL
Volatile Organics								
1,1,1,2-Tetrachloroethane	0 / 170	ND	ND	ND	1	20	NA	No
1,1,1-Trichloroethane	60 / 169	0.3	117	T8-4 (10/4/13)	1	5	200	No
1,1,2,2-Tetrachloroethane	0 / 170	ND	ND	ND	1	20	NA	No
1,1,2-Trichloroethane	0 / 170	ND	ND	ND	1	20	NA	No
1,1-Dichloroethane	50 / 169	0.23	108	T7-2 (10/1/2013)	1	1	NA	NA
1,1-Dichloroethene	53 / 168	0.21	8.5	DC-3 (10/16/2013)	1	**20**	7	**YES**
1,1-Dichloropropene	0 / 170	ND	ND	ND	1	20	NA	No
1,2,3-Trichlorobenzene	0 / 170	ND	ND	ND	1	20	NA	No
1,2,3-Trichloropropane	0 / 170	ND	ND	ND	1	40	NA	No
1,2,4-Trichlorobenzene	0 / 170	ND	ND	ND	1	20	70	No
1,2,4-Trimethylbenzene	9 / 170	0.22	1985	T8-1 (10/4/13)	1	40	NA	NA
1,2-Dibromoethane	0 / 170	ND	ND	ND	**1**	**20**	0.05	No
1,2-Dichlorobenzene	0 / 170	ND	ND	ND	1	20	600	No
1,2-Dichloroethane	1 / 170	0.48	0.48	T7-2 (10/1/2013)	1	**20**	5	No
1,2-Dichloropropane	0 / 170	ND	ND	ND	1	**20**	5	No
1,3,5-Trimethylbenzene	7 / 170	0.4	512	T8-1 (10/4/13)	1	40	NA	NA
1,3-Dichlorobenzene	0 / 170	ND	ND	ND	1	20	NA	No
1,3-Dichloropropane	0 / 170	ND	ND	ND	1	20	NA	No
1,4-Dichlorobenzene	0 / 170	ND	ND	ND	1	20	75	No
1,4-Dioxane	0 / 109	ND	ND	ND	200	4000	NA	No
2,2-Dichloropropane	0 / 170	ND	ND	ND	1	20	NA	No
2-Butanone	0 / 110	ND	ND	ND	5	100	NA	No
2-Chloroethyl Vinyl Ether	0 / 92	ND	ND	ND	5	100	NA	No
2-Chlorotoluene	0 / 170	ND	ND	ND	1	20	NA	No
2-Hexanone (methyl butyl ketone)	0 / 170	ND	ND	ND	10	200	NA	No
4-Chlorotoluene	0 / 170	ND	ND	ND	1	20	NA	No
4-Isopropyltoluene	2 / 170	0.22	5.05	T8-1 (10/4/13)	1	20	NA	NA
4-Methyl-2-Pentanone	2 / 110	2.95	9.6	T8-0 (10/4/13)	5	100	NA	NA
Acetone	5 / 110	12.7	236	T8-1 (10/4/13)	10	500	NA	NA
Acrolein	0 / 109	ND	ND	ND	20	400	NA	No
Acrylonitrile	0 / 109	ND	ND	ND	10	200	NA	No
Benzene	31 / 169	0.23	2.15	T8-5 (10/4/13)	1	**20**	5	No

TABLE 2-13
COMPARISON OF ONSITE AND DOWNGRADIENT GROUNDWATER DATA TO FEDERAL MCLs
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	Federal MCL [1] (ug/L)	Constituent Exceeds MCL
Volatile Organics (continued)								
Bromobenzene	0 / 170	ND	ND	ND	1	20	NA	No
Bromochloromethane	0 / 170	ND	ND	ND	1	20	NA	No
Bromodichloromethane	0 / 170	ND	ND	ND	1	20	8.0E+01(F)	No
Bromoform	0 / 170	ND	ND	ND	1	20	8.0E+01(F)	No
Bromomethane	0 / 170	ND	ND	ND	1	40	NA	No
Carbon Disulfide	7 / 110	0.58	6.6	JC-5 (10/18/2013)	2	40	NA	NA
Carbon Tetrachloride	0 / 167	ND	ND	ND	1	**20**	5	No
Chlorobenzene	2 / 170	0.3	0.3	SK-3S (10/20/2013)	1	20	100	No
Dibromochloromethane	0 / 170	ND	ND	ND	1	20	8.0E+01(F)	No
Dibromochloropropane (DBCP)	0 / 169	ND	ND	ND	2	40	NA	No
Chloroethane	1 / 170	0.7	0.7	T8-5 (10/4/13)	1	40	NA	NA
Chloroform	13 / 168	0.28	1.5	SK-3S (4/19/2012)	1	20	80	No
Chloromethane	3 / 170	0.51	0.555	T8-5 (10/4/13)	1	40	NA	NA
Cis-1,2-Dichloroethene	160 / 170	0.27	1710	DC-3 (10/16/2013)	1	1	70	**YES**
Cis-1,3-Dichloropropene	0 / 110	ND	ND	ND	1	20	NA	No
Dibromomethane	0 / 170	ND	ND	ND	1	40	NA	No
Dichlorodifluoromethane	0 / 170	ND	ND	ND	1	40	NA	No
Ethylbenzene	11 / 170	0.31	1980	T8-1 (10/4/13)	1	5	700	**YES**
Hexachlorobutadiene	0 / 170	ND	ND	ND	1	40	NA	No
Isopropylbenzene	7 / 170	0.36	102.5	T8-1 (10/4/13)	1	20	NA	NA
M,P-Xylenes	16 / 169	0.35	3840	T8-1 (10/4/13)	2	10	NA	NA
Methyl Tert-Butyl Ether	2 / 110	0.34	5.8	T8-5 (10/4/13)	1	20	NA	NA
Methylene Chloride	2 / 170	4.1	13.1	SK-2S (10/20/2013)	1	**100**	5	**YES**
Naphthalene	3 / 170	1	346	T8-1 (10/4/13)	3	60	NA	NA
N-Butylbenzene	5 / 170	0.29	19.0999995	T8-1 (10/4/13)	1	20	NA	NA
N-Propylbenzene	8 / 169	0.31	345.5	T8-1 (10/4/13)	1	20	NA	NA
O-Xylene	16 / 169	0.27	485.5	T8-1 (10/4/13)	1	20	NA	NA
Sec-Butylbenzene	8 / 170	0.28	13.35	T8-1 (10/4/13)	1	20	NA	NA
Styrene	0 / 170	ND	ND	ND	1	20	100	No
Tert-Butylbenzene	7 / 170	0.31	0.71	T8-2 (10/4/13)	1	20	NA	NA
Tetrachloroethene	136 / 170	0.365	724.5	SK-2S (4/18/2013)	1	**20**	5	**YES**
Toluene	14 / 170	0.21	137.5	T8-1 (10/4/13)	1	5	1000	No
Trans-1,2-Dichloroethene	35 / 170	0.25	7.2	SK-2S (4/18/2013)	1	20	100	No

TABLE 2-13
COMPARISON OF ONSITE AND DOWNGRADIENT GROUNDWATER DATA TO FEDERAL MCLs
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	Federal MCL [1] (ug/L)	Constituent Exceeds MCL
Volatile Organics (continued)								
Trans-1,3-Dichloropropene	0 / 110	ND	ND	ND	1	20	NA	No
Trichloroethene	148 / 170	0.35	219.5	SK-2S (4/18/2013)	1	**20**	5	**YES**
Trichlorofluoromethane	4 / 169	0.65	1.2	SK-13S (10/19/2013)	1	40	NA	N
Vinyl Acetate	0 / 109	ND	ND	ND	10	200	NA	No
Vinyl Chloride	35 / 170	0.45	102.049999	T8-1 (10/4/13)	1	**5**	2	**YES**
Total Xylenes	19 / 169	0.35	4405.25	T8-1 (10/4/13)	2	10	NA	NA
Semi-Volatile Organics								
1,2,4-Trichlorobenzene	0 / 13	ND	ND	ND	4.7	5.3	70	No
1,2-Dichlorobenzene	0 / 12	ND	ND	ND	4.7	5.3	600	No
1,2-Diphenylhydrazine	0 / 13	ND	ND	ND	4.7	5.3	NA	No
1,3-Dichlorobenzene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
1,4-Dichlorobenzene	0 / 13	ND	ND	ND	4.7	5.3	75	No
1,4-Dioxane	0 / 2	ND	ND	ND	4.7	4.8	NA	No
1-Methylnaphthalene	1 / 13	6.2	6.2	S1-1 (10/8/2013)	4.7	5.3	NA	NA
2,4,5-Trichlorophenol	0 / 13	ND	ND	ND	4.7	5.3	NA	No
2,4,6-Trichlorophenol	0 / 13	ND	ND	ND	4.7	5.3	NA	No
2,4-Dichlorophenol	0 / 12	ND	ND	ND	4.7	5.3	NA	No
2,4-Dimethylphenol	0 / 13	ND	ND	ND	4.7	5.3	NA	No
2,4-Dinitrophenol	0 / 13	ND	ND	ND	24	27	NA	No
2,4-Dinitrotoluene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
2,6-Dinitrotoluene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
2-Chloronaphthalene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
2-Chlorophenol	0 / 12	ND	ND	ND	4.7	5.3	NA	No
2-Methylnaphthalene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
2-Methylphenol	0 / 13	ND	ND	ND	4.7	5.3	NA	No
2-Nitroaniline	0 / 13	ND	ND	ND	4.7	5.3	NA	No
2-Nitrophenol	0 / 13	ND	ND	ND	4.7	5.3	NA	No
3,3'-Dichlorobenzidine	0 / 13	ND	ND	ND	4.7	5.3	NA	No
3-Nitroaniline	0 / 13	ND	ND	ND	4.7	5.3	NA	No
4,6-Dinitro-2-Methylphenol	0 / 13	ND	ND	ND	9.4	11	NA	No
4-Bromophenyl Phenyl Ether	0 / 9	ND	ND	ND	4.7	5.3	NA	No
4-Chloro-3-Methylphenol	0 / 12	ND	ND	ND	4.7	5.3	NA	No

TABLE 2-13
COMPARISON OF ONSITE AND DOWNGRADIENT GROUNDWATER DATA TO FEDERAL MCLs
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	Federal MCL [1] (ug/L)	Constituent Exceeds MCL
Semi-Volatile Organics (continued)								
4-Chloroaniline	0 / 13	ND	ND	ND	4.7	5.3	NA	No
4-Chlorophenyl Phenyl Ether	0 / 13	ND	ND	ND	4.7	5.3	NA	No
4-Nitroaniline	0 / 13	ND	ND	ND	4.7	5.3	NA	No
4-Nitrophenol	0 / 13	ND	ND	ND	24	27	NA	No
Acenaphthene	3 / 13	0.69	2.8	S1-1 (10/8/2013)	4.7	5.3	NA	NA
Acenaphthylene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Aniline	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Anthracene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Benzidine	0 / 13	ND	ND	ND	24	27	NA	No
Benzo(A)Anthracene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Benzo(A)Pyrene	0 / 13	ND	ND	ND	**4.7**	**5.3**	0.2	No
Benzo(B)Fluoranthene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Benzo(G,H,I)Perylene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Benzo(K)Fluoranthene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Benzoic Acid	0 / 13	ND	ND	ND	47	53	NA	No
Benzyl Alcohol	0 / 12	ND	ND	ND	4.7	5.3	NA	No
Bis(2-Chloroethoxy)Methane	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Bis(2-Chloroethyl)Ether	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Bis(2-Chloroisopropyl)Ether	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Bis(2-Ethylhexyl) Phthalate	0 / 13	ND	ND	ND	4.7	5.3	6	No
Butyl Benzyl Phthalate	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Carbazole	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Chrysene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Dibenz(A,H)Anthracene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Dibenzofuran	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Diethyl Phthalate	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Dimethyl Phthalate	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Di-N-Butyl Phthalate	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Di-N-Octyl Phthalate	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Fluoranthene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Fluorene	1 / 13	0.74	0.74	S1-1 (10/8/2013)	4.7	5.3	NA	NA
Hexachloro-1,3-Cyclopentadiene	0 / 13	ND	ND	ND	4.7	5.3	50	No

TABLE 2-13
COMPARISON OF ONSITE AND DOWNGRADIENT GROUNDWATER DATA TO FEDERAL MCLs
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	Federal MCL [1] (ug/L)	Constituent Exceeds MCL
Semi-Volatile Organics (continued)								
Hexachlorobenzene	0 / 13	ND	ND	ND	**4.7**	**5.3**	1	No
Hexachlorobutadiene	0 / 10	ND	ND	ND	4.7	5.3	NA	No
Hexachloroethane	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Indeno(1,2,3-Cd)Pyrene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Isophorone	0 / 13	ND	ND	ND	4.7	5.3	NA	No
M-,P-Cresol Mixture	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Naphthalene	0 / 10	ND	ND	ND	4.7	5.3	NA	No
Nitrobenzene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
N-Nitrosodimethylamine	0 / 13	ND	ND	ND	4.7	5.3	NA	No
N-Nitrosodi-N-Propylamine	0 / 13	ND	ND	ND	4.7	5.3	NA	No
N-Nitrosodiphenylamine	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Pentachlorophenol	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Phenanthrene	0 / 13	ND	ND	ND	**24**	**27**	1	No
Phenol	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Pyrene	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Pyridine	0 / 13	ND	ND	ND	4.7	5.3	NA	No
Total Petroleum Hydrocarbons					9.4	11	NA	No
DRO (C10-C28) Range	4 / 6	0.384	0.668	S11-3 (10/3/2013)	0.24	0.24	NA	NA
Total Inorganics								
Arsenic	7 / 21	12.4	105	A10-4 (10/1/2013)	10	10	10	**YES**
Barium	15 / 21	206	3540	A10-4 (10/1/2013)	200	200	2000	**YES**
Cadmium	0 / 21	ND	ND	ND	5	**10**	5	No
Calcium	4 / 4	103000	165000	A10-4 (10/1/2013)	--	--	NA	NA
Chromium	12 / 21	12.1	343	A10-4 (10/1/2013)	10	10	100	**YES**
Iron	3 / 3	1720	311000	A10-4 (10/1/2013)	--	--	NA	NA
Lead	15 / 21	5.4	762	A10-4 (10/1/2013)	5	5	15	**YES**
Magnesium	4 / 4	33500	102000	A10-4 (10/1/2013)	--	--	NA	NA
Manganese	3 / 3	1330	16100	A10-4 (10/1/2013)	--	--	NA	NA
Mercury	1 / 21	0.7	0.7	A10-4 (10/1/2013)	0.5	0.5	2	No
Potassium	2 / 3	11000	43100	A10-4 (10/1/2013)	10000	10000	NA	NA
Selenium	0 / 21	ND	ND	ND	10	20	50	No
Silver	0 / 21	ND	ND	ND	10	20	NA	No
Sodium	3 / 3	42800	49400	S18-4 (10/8/13)	--	--	NA	NA

TABLE 2-13
COMPARISON OF ONSITE AND DOWNGRADIENT GROUNDWATER DATA TO FEDERAL MCLs
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	Federal MCL [1] (ug/L)	Constituent Exceeds MCL
Dissolved Inorganics								
Arsenic	1 / 4	14	14	T6-2 (10/17/2013)	10	10	10	**YES**
Barium	1 / 4	309	309	S11-1 (10/4/13)	200	200	2000	No
Cadmium	0 / 4	ND	ND	ND	5	5	5	No
Calcium	4 / 4	102000	123000	S11-1 (10/4/13)	--	--	NA	No
Chromium	0 / 4	ND	ND	ND	10	10	100	No
Iron	1 / 4	3870	3870	T6-2 (10/17/2013)	5	5	NA	NA
Lead	1 / 2	8.6	8.6	T6-2 (10/17/2013)	5	5	15	No
Magnesium	4 / 4	32800	38700	A10-4 (10/1/2013)	--	--	NA	NA
Manganese	3 / 3	1350	3560	A10-4 (10/1/2013)	--	--	NA	No
Mercury	0 / 4	ND	ND	ND	0.5	0.5	2	No
Potassium	0 / 3	ND	ND	ND	10000	10000	NA	No
Selenium	0 / 4	ND	ND	ND	10	10	50	No
Silver	0 / 4	ND	ND	ND	10	10	NA	No
Sodium	3 / 3	46400	50300	S18-4 (10/8/13)	--	--	NA	NA
Misc. Parameters								
Chloride	3 / 3	32900.002	62400.002	S18-4 (10/8/13)	--	--	NA	NA
Chloride (Dissolved)	3 / 3	34500	67699.997	S18-4 (10/8/13)	--	--	NA	NA
Fluoride	0 / 3	ND	ND	ND	1000	1000	NA	No
Nitrate as N	0 / 3	ND	ND	ND	500	500	10000	No
Sulfate	3 / 3	26000	138000	S18-4 (10/8/13)	--	--	NA	NA
Sulfate (Dissolved)	3 / 3	27600	142000	S18-4 (10/8/13)	--	--	NA	NA
Sulfide	1 / 3	0.48	0.48	T6-2 (10/17/2013)	1000	1000	NA	NA

Notes:
Values in bold indicate detection limit exceeds screening level.
'"- -" Constituent detected in every sample; detection limit not presented.
NA- Not Available or Not Applicable.
ND- Not Detected.

TABLE 2-14
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN UPGRADIENT GROUNDWATER - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	USEPA Tapwater RSL [1] (µg/L)	Constituent of Interest	Comment
Volatile Organics									
1,1,1,2-Tetrachloroethane	0 / 44	ND	ND	ND	1	**1**	0.5	No	Constituent not detected.
1,1,1-Trichloroethane	0 / 44	ND	ND	ND	1	1	750	No	Constituent not detected.
1,1,2,2-Tetrachloroethane	0 / 44	ND	ND	ND	1	**1**	0.066	No	Constituent not detected.
1,1,2-Trichloroethane	0 / 44	ND	ND	ND	1	**1**	0.041	No	Constituent not detected.
1,1-Dichloroethane	1 / 44	0.24	0.24	SK-8D (10/19/2013)	1	1	2.4	No	Maximum detect below screening value.
1,1-Dichloroethene	6 / 43	0.24	0.42	MW-14 (10/19/2013)	1	1	26	No	Maximum detect below screening value.
1,1-Dichloropropene	0 / 44	ND	ND	ND	1	1	NA	No	Constituent not detected.
1,2,3-Trichlorobenzene	0 / 44	ND	ND	ND	1	**1**	0.52	No	Constituent not detected.
1,2,3-Trichloropropane	0 / 44	ND	ND	ND	1	**2**	0.00065	No	Constituent not detected.
1,2,4-Trichlorobenzene	0 / 44	ND	ND	ND	1	**1**	0.39	No	Constituent not detected.
1,2,4-Trimethylbenzene	1 / 44	0.52	0.52	WND-32S (10/19/2013)	1	**2**	1.5	No	Maximum detect below screening value.
1,2-Dibromoethane	0 / 44	ND	ND	ND	1	**1**	0.0065	No	Constituent not detected.
1,2-Dichlorobenzene	0 / 44	ND	ND	ND	1	1	28	No	Constituent not detected.
1,2-Dichloroethane	0 / 44	ND	ND	ND	1	**1**	0.15	No	Constituent not detected.
1,2-Dichloropropane	0 / 44	ND	ND	ND	1	**1**	0.38	No	Constituent not detected.
1,3,5-Trimethylbenzene	0 / 44	ND	ND	ND	1	2	8.7	No	Constituent not detected.
1,3-Dichlorobenzene	0 / 44	ND	ND	ND	1	1	NA	No	Constituent not detected.
1,3-Dichloropropane	0 / 44	ND	ND	ND	1	1	29	No	Constituent not detected.
1,4-Dichlorobenzene	0 / 44	ND	ND	ND	1	**1**	0.42	No	Constituent not detected.
1,4-Dioxane	0 / 11	ND	ND	ND	200	**200**	0.67	No	Constituent not detected.
2,2-Dichloropropane	0 / 44	ND	ND	ND	1	1	NA	No	Constituent not detected.
2-Butanone	0 / 11	ND	ND	ND	5	5	490	No	Constituent not detected.
2-Chloroethyl Vinyl Ether	0 / 11	ND	ND	ND	5	5	NA	No	Constituent not detected.
2-Chlorotoluene	0 / 44	ND	ND	ND	1	1	18	No	Constituent not detected.
2-Hexanone (methyl butyl ketone)	0 / 44	ND	ND	ND	10	**10**	3.4	No	Constituent not detected.
4-Chlorotoluene	0 / 44	ND	ND	ND	1	1	19	No	Constituent not detected.
4-Isopropyltoluene	0 / 44	ND	ND	ND	1	1	39	No	Constituent not detected.
4-Methyl-2-Pentanone	0 / 11	ND	ND	ND	5	5	100	No	Constituent not detected.
Acetone	0 / 11	ND	ND	ND	25	25	1200	No	Constituent not detected.
Acrolein	0 / 11	ND	ND	ND	20	**20**	0.0041	No	Constituent not detected.

TABLE 2-14
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN UPGRADIENT GROUNDWATER - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	USEPA Tapwater RSL [1] (µg/L)	Constituent of Interest	Comment
Volatile Organics (continued)									
Acrylonitrile	0 / 11	ND	ND	ND	10	**10**	0.045	No	Constituent not detected.
Benzene	8 / 44	0.53	2.5	MW-18 (10/19/2013)	1	**1**	0.39	**YES**	Maximum detect exceeds screening value.
Bromobenzene	0 / 44	ND	ND	ND	1	1	5.4	No	Constituent not detected.
Bromochloromethane	0 / 44	ND	ND	ND	1	1	8.3	No	Constituent not detected.
Bromodichloromethane	0 / 44	ND	ND	ND	1	**1**	0.12	No	Constituent not detected.
Bromoform	0 / 44	ND	ND	ND	1	1	7.9	No	Constituent not detected.
Bromomethane	0 / 44	ND	ND	ND	1	**2**	0.7	No	Constituent not detected.
Carbon Disulfide	0 / 11	ND	ND	ND	2	2	72	No	Constituent not detected.
Carbon Tetrachloride	1 / 44	0.64	0.64	WND-32DR (10/19/2013)	1	**1**	0.39	**YES**	Maximum detect exceeds screening value.
Chlorobenzene	2 / 44	0.29	0.34	WND-32DR (10/19/2013)	1	1	7.2	No	Maximum detect below screening value.
Dibromochloromethane	0 / 44	ND	ND	ND	1	**1**	0.15	No	Constituent not detected.
Dibromochloropropane (DBCP)	0 / 44	ND	ND	ND	2	2	NA	No	Constituent not detected.
Chloroethane	0 / 44	ND	ND	ND	1	2	2100	No	Constituent not detected.
Chloroform	4 / 44	0.39	1.5	WND-32S (4/18/2013)	1	**1**	0.19	**YES**	Maximum detect exceeds screening value.
Chloromethane	0 / 44	ND	ND	ND	1	2	19	No	Constituent not detected.
Cis-1,2-Dichloroethene	40 / 44	0.29	34.200001	SK-8D (10/19/2013)	1	1	2.8	**YES**	Maximum detect exceeds screening value.
Cis-1,3-Dichloropropene	0 / 11	ND	ND	ND	1	1	NA	No	Constituent not detected.
Dibromomethane	0 / 44	ND	ND	ND	1	**2**	0.79	No	Constituent not detected.
Dichlorodifluoromethane	0 / 44	ND	ND	ND	2	2	19	No	Constituent not detected.
Ethylbenzene	2 / 44	0.52	0.82	WND-32S (10/19/2013)	1	1	1.3	No	Maximum detect below screening value.
Hexachlorobutadiene	0 / 44	ND	ND	ND	1	**2**	0.26	No	Constituent not detected.
Isopropylbenzene	14 / 44	0.45	3.85	MW-10 (10/31/2012)	1	1	39	No	Maximum detect below screening value.
M,P-Xylenes	4 / 44	0.58	2.6	WND-32S (4/18/2013)	2	2	19	No	Maximum detect below screening value.
Methyl Tert-Butyl Ether	0 / 11	ND	ND	ND	1	1	12	No	Constituent not detected.
Methylene Chloride	0 / 44	ND	ND	ND	4	5	8.4	No	Constituent not detected.
Naphthalene	9 / 44	1.9	35.5	MW-10 (10/31/2012)	3	**5**	0.14	**YES**	Maximum detect exceeds screening value.
N-Butylbenzene	7 / 44	0.21	2.5	MW-10 (10/31/2012)	1	1	78	No	Maximum detect below screening value.
N-Propylbenzene	11 / 44	0.51	9.15	MW-10 (10/31/2012)	1	1	53	No	Maximum detect below screening value.

TABLE 2-14
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN UPGRADIENT GROUNDWATER - DIRECT CONTACT
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	USEPA Tapwater RSL [1] (µg/L)	Constituent of Interest	Comment
Volatile Organics (continued)									
O-Xylene	4 / 44	0.3	0.93	MW-10 (10/19/2013)	1	1	19	No	Maximum detect below screening value.
Sec-Butylbenzene	11 / 44	0.49	2.85	MW-10 (10/31/2012)	1	1	160	No	Maximum detect below screening value.
Styrene	0 / 44	ND	ND	ND	1	1	110	No	Constituent not detected.
Tert-Butylbenzene	7 / 42	0.42	0.805	MW-10 (10/31/2012)	1	1	51	No	Maximum detect below screening value.
Tetrachloroethene	19 / 44	0.42	4.5	SK-8D (4/17/2013)	1	1	3.5	**YES**	Maximum detect exceeds screening value.
Toluene	2 / 44	0.36	0.56	MW-10 (10/19/2013)	1	1	86	No	Maximum detect below screening value.
Trans-1,2-Dichloroethene	5 / 44	0.47	3.6	MW-14 (10/31/2012)	1	1	8.6	No	Maximum detect below screening value.
Trans-1,3-Dichloropropene	0 / 11	ND	ND	ND	1	1	NA	No	Constituent not detected.
Trichloroethene	36 / 44	0.67	167	SK-8D (4/18/2012)	1	**1**	0.26	**YES**	Maximum detect exceeds screening value.
Trichlorofluoromethane	0 / 44	ND	ND	ND	1	2	110	No	Constituent not detected.
Vinyl Acetate	0 / 11	ND	ND	ND	10	10	41	No	Constituent not detected.
Vinyl Chloride	0 / 44	ND	ND	ND	1	**1**	0.015	No	Constituent not detected.
Total Xylenes	6 / 44	0.3	2.6	WND-32S (4/18/2013)	2	2	19	No	Maximum detect below screening value.

Notes:

Values in bold indicate detection limit exceeds screening level.

"- -" Constituent detected in every sample; detection limit not presented.

NA- Not Available

ND- Not Detected

[1] Screening levels are the USEPA Tapwater Regional Screening Level (RSL; USEPA, 2013a). Non-cancer based screening levels reflect a hazard quotient of 0.1.

TABLE 2-15
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN ONSITE GROUNDWATER - VAPOR INTRUSION
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	Groundwater Vapor Intrusion Screening Level [1] (ug/L)	Constituent of Interest	Comment
Volatile Organics									
1,1,1-Trichloroethane	53 / 148	0.3	87.1	DC-3 (10/16/2013)	1	5	5.20E+03	No	Maximum detect below screening value.
1,1-Dichloroethane	39 / 148	0.23	108	T7-2 (10/1/2013)	1	1	5.41E+01	**YES**	Maximum detect exceeds screening value.
1,1-Dichloroethene	45 / 147	0.21	8.5	DC-3 (10/16/2013)	1	5	1.24E+02	No	Maximum detect below screening value.
1,2,4-Trimethylbenzene	6 / 149	0.33	9.6	SK-3D (10/20/2013)	1	**40**	2.61E+01	No	Maximum detect below screening value.
1,2-Dichloroethane	1 / 149	0.48	0.48	T7-2 (10/1/2013)	1	**20**	1.70E+01	No	Maximum detect below screening value.
1,3,5-Trimethylbenzene	5 / 149	0.4	7.9	SK-3S (4/19/2012)	1	40	NA	No	Screening value not available.
4-Isopropyltoluene	1 / 149	0.22	0.22	A12-3 (10/9/2013)	1	20	NA	No	Screening value not available.
Acetone	2 / 98	12.7	14.7	JC-5a (10/18/2013)	10	500	1.55E+07	No	Maximum detect below screening value.
Benzene	27 / 148	0.23	2	S24-2 (10/8/2013)	1	**20**	1.18E+01	No	Maximum detect below screening value.
Carbon Disulfide	7 / 98	0.58	6.6	JC-5 (10/18/2013)	2	40	8.05E+02	No	Maximum detect below screening value.
Chlorobenzene	2 / 149	0.3	0.3	SK-3S (10/20/2013)	1	20	3.26E+02	No	Maximum detect below screening value.
Chloroethane	0 / 149	ND	ND	ND	1	40	1.42E+04	No	Constituent not detected.
Chloroform	13 / 147	0.28	1.5	SK-3S (4/19/2012)	1	**20**	5.81E+00	No	Maximum detect below screening value.
Chloromethane	2 / 149	0.51	0.52	S14-4 (10/7/13)	1	40	1.49E+02	No	Maximum detect below screening value.
Cis-1,2-Dichloroethene	141 / 149	0.27	1710	DC-3 (10/16/2013)	1	1	NA	No	Screening value not available.
Ethylbenzene	7 / 149	0.99	43.1	A12-3 (10/9/2013)	1	5	2.95E+01	**YES**	Maximum detect exceeds screening value.
Isopropylbenzene	3 / 149	0.36	1.6	A12-3 (10/9/2013)	1	20	8.48E+02	No	Maximum detect below screening value.
M,P-Xylenes	12 / 148	0.36	134	A12-3 (10/9/2013)	2	10	2.91E+02	No	Maximum detect below screening value.
Methylene Chloride	2 / 149	4.1	13.1	SK-2S (10/20/2013)	1	100	3.12E+03	No	Maximum detect below screening value.
Naphthalene	1 / 149	1	1	T1-1 (10/7/2013)	3	**60**	4.65E+01	No	Maximum detect below screening value.
N-Butylbenzene	1 / 149	0.29	0.3	A12-3 (10/9/2013)	1	20	NA	No	Screening value not available.
N-Propylbenzene	4 / 148	0.31	1.9	A12-3 (10/9/2013)	1	20	2.14E+03	No	Maximum detect below screening value.
O-Xylene	13 / 148	0.27	49.6	A12-3 (10/9/2013)	1	20	4.03E+02	No	Maximum detect below screening value.
Sec-Butylbenzene	3 / 149	0.28	0.56	S11-3 (10/3/2013)	1	20	NA	No	Screening value not available.
Tert-Butylbenzene	4 / 149	0.31	0.43	S11-1 (10/4/13)	1	20	NA	No	Screening value not available.
Tetrachloroethene	121 / 149	0.365	724.5	SK-2S (4/18/2013)	1	1	4.51E+01	**YES**	Maximum detect exceeds screening value.
Toluene	9 / 149	0.21	41.2	A12-3 (10/9/2013)	1	5	1.46E+04	No	Maximum detect below screening value.
Trans-1,2-Dichloroethene	26 / 149	0.25	7.2	SK-2S (4/18/2013)	1	20	2.52E+02	No	Maximum detect below screening value.
Trichloroethene	130 / 149	0.35	220	SK-2S (4/18/2013)	1	1	3.79E+00	**YES**	Maximum detect exceeds screening value.

TABLE 2-15
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN ONSITE GROUNDWATER - VAPOR INTRUSION
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Groundwater Concentration (µg/L)	Maximum Detected Groundwater Concentration (µg/L)	Sample with Maximum Detect	Minimum Detection Limit (µg/L)	Maximum Detection Limit (µg/L)	Groundwater Vapor Intrusion Screening Level [1] (ug/L)	Constituent of Interest	Comment
Volatile Organics (continued)									
Trichlorofluoromethane	3 / 148	0.65	0.99	SK-1S (10/4/2013)	1	40	1.15E+02	No	Maximum detect below screening value.
Vinyl Chloride	23 / 149	0.45	102	S11-2 (10/3/2013)	1	**5**	3.39E+00	**YES**	Maximum detect exceeds screening value.
Total Xylenes	14 / 148	0.63	184	A12-3 (10/9/2013)	2	10	4.03E+02	No	Maximum detect below screening value.
Semi-Volatile Organics									
1-Methylnaphthalene	1 / 13	6.2	6.2	S1-1 (10/8/2013)	4.7	5.3	NA	No	Screening value not available.
Acenaphthene	3 / 13	0.69	2.8	S1-1 (10/8/2013)	4.7	5.3	NA	No	Screening value not available.
Fluorene	1 / 13	0.74	0.74	S1-1 (10/8/2013)	4.7	5.3	NA	No	Screening value not available.

Notes:

Values in bold indicate detection limit exceeds screening level.

"- -" Constituent detected in every sample; detection limit not presented.

NA- Screening vales not available because no inhalation toxicity values are available.

[1] Target groundwater vapor intrusion screening levels (VISLs) were calculated using the USEPA (2013b) VISL Calculator 3.2, using a target hazard quotient of 0.1, and a target risk of 1E-6.

TABLE 2-16
IDENTIFICATION OF CONSTITUENTS OF INTEREST IN SOIL GAS
Clean Harbors Kansas, LLC- Wichita, Kansas

Constituent	Frequency of Detection	Minimum Detected Soil Gas Concentration (µg/m³)	Maximum Detected Soil Gas Concentration (µg/m³)	Sample with Maximum Detect	Minimum Detection Limit (µg/m³)	Maximum Detection Limit (µg/m³)	Soil Gas Vapor Intrusion Screening Level [1] (ug/m³)	Constituent of Interest	Comment
Volatile Organics									
1,1,1-Trichloroethane	0 / 2	ND	ND	ND	4.4	4.4	21900	No	Constituent not detected.
1,1,2,2-Tetrachloroethane	0 / 2	ND	ND	ND	**5.5**	**5.5**	2.11	No	Constituent not detected.
1,1,2-Trichloroethane	0 / 2	ND	ND	ND	**4.4**	**4.4**	0.88	No	Constituent not detected.
1,1-Dichloroethane	0 / 2	ND	ND	ND	3.2	3.2	76.7	No	Constituent not detected.
1,1-Dichloroethylene	0 / 2	ND	ND	ND	3.2	3.2	876	No	Constituent not detected.
1,2,4-Trichlorobenzene	0 / 2	ND	ND	ND	5.9	5.9	8.76	No	Constituent not detected.
1,2,4-Trimethylbenzene	0 / 2	ND	ND	ND	3.9	3.9	30.7	No	Constituent not detected.
1,2-Dibromoethane	0 / 2	ND	ND	ND	**6.1**	**6.1**	0.20	No	Constituent not detected.
1,2-Dichloroethane	0 / 2	ND	ND	ND	3.2	3.2	4.72	No	Constituent not detected.
1,2-Dichloropropane	0 / 2	ND	ND	ND	3.7	3.7	12.3	No	Constituent not detected.
1,3,5-Trimethylbenzene	0 / 2	ND	ND	ND	3.9	3.9	NA	No	Constituent not detected.
1,3-Butadiene	0 / 2	ND	ND	ND	1.8	1.8	4.09	No	Constituent not detected.
1,4-Dioxane	0 / 2	ND	ND	ND	2.9	2.9	NV	No	Constituent not detected.
2,2,4-Trimethylpentane	0 / 2	ND	ND	ND	3.7	3.7	NA	No	Constituent not detected.
2-Chlorotoluene	0 / 2	ND	ND	ND	4.1	4.1	NA	No	Constituent not detected.
2-Hexanone	0 / 2	ND	ND	ND	3.3	3.3	131	No	Constituent not detected.
3-Chloropropene	0 / 2	ND	ND	ND	2.5	2.5	NA	No	Constituent not detected.
4-Ethyltoluene	0 / 2	ND	ND	ND	3.9	3.9	NA	No	Constituent not detected.
Acetone	2 / 2	97.6	189	AS-4	- -	- -	135780	No	Maximum detect below screening value.
Benzene	1 / 2	2	2	AS-4	2.6	2.6	15.7	No	Maximum detect below screening value.
Benzyl Chloride	0 / 2	ND	ND	ND	**4.1**	**4.1**	2.50	No	Constituent not detected.
Bromodichloromethane	0 / 2	ND	ND	ND	**5.4**	**5.4**	3.31	No	Constituent not detected.
Bromoethene	0 / 2	ND	ND	ND	3.5	3.5	NA	No	Constituent not detected.
Bromoform	0 / 2	ND	ND	ND	8.3	8.3	NV	No	Constituent not detected.
Bromomethane	0 / 2	ND	ND	ND	3.1	3.1	21.9	No	Constituent not detected.
Carbon disulfide	1 / 2	1.3	1.3	AS-5	2.5	2.5	3066	No	Maximum detect below screening value.
Carbon tetrachloride	0 / 2	ND	ND	ND	5	5	20.4	No	Constituent not detected.
Chlorobenzene	0 / 2	ND	ND	ND	3.7	3.7	219	No	Constituent not detected.
Chloroethane	0 / 2	ND	ND	ND	2.1	2.1	43800	No	Constituent not detected.
Chloroform	0 / 2	ND	ND	ND	3.9	3.9	5.33	No	Constituent not detected.
Chloromethane	1 / 2	1.9	1.9	AS-4	1.7	1.7	394	No	Screening value not available.
cis-1,2-Dichloroethylene	0 / 2	ND	ND	ND	3.2	3.2	NA	No	Constituent not detected.
cis-1,3-Dichloropropene [2]	0 / 2	ND	ND	ND	3.6	3.6	30.7	No	Constituent not detected.
Cyclohexane	2 / 2	4.5	22	AS-4	- -	- -	26280	No	Maximum detect below screening value.

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Constituent	Frequency of Detection	Minimum Detected Soil Gas Concentration (µg/m³)	Maximum Detected Soil Gas Concentration (µg/m³)	Sample with Maximum Detect	Minimum Detection Limit (µg/m³)	Maximum Detection Limit (µg/m³)	Soil Gas Vapor Intrusion Screening Level [1] (ug/m³)	Constituent of Interest	Comment
Volatile Organics (continued)									
Dibromochloromethane	0 / 2	ND	ND	ND	**6.8**	**6.8**	4.54	No	Constituent not detected.
Dichlorodifluoromethane	0 / 2	ND	ND	ND	4	4	438	No	Constituent not detected.
Ethanol [3]	2 / 2	83.5	91.4	AS-4	--	--	3066	No	Maximum detect below screening value.
Ethyl Acetate	0 / 2	ND	ND	ND	2.9	2.9	307	No	Constituent not detected.
Ethylbenzene	0 / 2	ND	ND	ND	3.5	3.5	49.1	No	Constituent not detected.
Freon 113	0 / 2	ND	ND	ND	6.1	6.1	131400	No	Constituent not detected.
Freon 114	0 / 2	ND	ND	ND	5.6	5.6	NA	No	Constituent not detected.
Heptane [3]	1 / 2	3	3	AS-5	3.3	3.3	3066	No	Maximum detect below screening value.
Hexachlorobutadiene	0 / 2	ND	ND	ND	8.5	8.5	NV	No	Constituent not detected.
Hexane	2 / 2	16	28	AS-5	--	--	3066	No	Maximum detect below screening value.
Isopropyl Alcohol	2 / 2	14	41.3	AS-4	--	--	NV	No	Constituent not sufficiently volatile.
m,p-Xylene	2 / 2	2.2	2.8	AS-4	--	--	438	No	Maximum detect below screening value.
m-Dichlorobenzene	0 / 2	ND	ND	ND	4.8	4.8	NA	No	Constituent not detected.
Methyl ethyl ketone	2 / 2	15	52.5	AS-4	--	--	21900	No	Maximum detect below screening value.
Methyl Isobutyl Ketone	1 / 2	6.6	6.6	AS-5	3.3	3.3	13140	No	Maximum detect below screening value.
Methyl Tert Butyl Ether	0 / 2	ND	ND	ND	2.9	2.9	472	No	Constituent not detected.
Methylene chloride	2 / 2	60.8	79.9	AS-4	--	--	2628	No	Maximum detect below screening value.
Methylmethacrylate	0 / 2	ND	ND	ND	3.3	3.3	3066	No	Constituent not detected.
o-Dichlorobenzene	0 / 2	ND	ND	ND	4.8	4.8	876	No	Constituent not detected.
o-Xylene	0 / 2	ND	ND	ND	3.5	3.5	438	No	Constituent not detected.
p-Dichlorobenzene	0 / 2	ND	ND	ND	4.8	4.8	11.1	No	Constituent not detected.
Propylene	0 / 2	ND	ND	ND	3.4	3.4	13140	No	Constituent not detected.
Styrene	0 / 2	ND	ND	ND	3.4	3.4	4380	No	Constituent not detected.
Tertiary Butyl Alcohol	0 / 2	ND	ND	ND	2.4	2.4	NA	No	Constituent not detected.
Tetrachloroethylene	1 / 2	6	6	AS-5	1.1	1.1	175	No	Maximum detect below screening value.
Tetrahydrofuran	2 / 2	23	67.8	AS-4	--	--	8760	No	Maximum detect below screening value.
Toluene	2 / 2	11	62.2	AS-5	--	--	21900	No	Maximum detect below screening value.
trans-1,2-Dichloroethylene	0 / 2	ND	ND	ND	3.2	3.2	263	No	Constituent not detected.
trans-1,3-Dichloropropene	0 / 2	ND	ND	ND	3.6	3.6	30.7	No	Constituent not detected.
Trichloroethylene	0 / 2	ND	ND	ND	0.86	0.86	8.76	No	Constituent not detected.
Trichlorofluoromethane	2 / 2	2.4	2.4	AS-4	--	--	3066	No	Maximum detect below screening value.
Vinyl Acetate	0 / 2	ND	ND	ND	2.8	2.8	876	No	Constituent not detected.

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Volatile Organics (continued)									
Vinyl chloride	0 / 2	ND	ND	ND	2	2	27.9	No	Constituent not detected.
Xylenes (total)	2 / 2	2.2	2.8	AS-4	- -	- -	438	No	Maximum detect below screening value.

Notes:

Values in bold indicate detection limit exceeds screening level.

"- -" Constituent detected in every sample; detection limit not presented.

NA- Screening vales not available because no inhalation toxicity values are available.

NV- Not Volatile

"- -" Constituent detected in every sample; detection limit not presented.

[1] Target sub-slab vapor intrusion screening levels (VISLs) were calculated using the USEPA (2013b) VISL Calculator 3.2, using a target hazard quotient of 0.1, a target risk of 1E-6, a commercial scenario, and a system temperature of 13.9 ° C.

[2] The screening value for cis-dichloropropene is based on the value for 1,3-dichloropropene.

[3] The screening value for ethanol and heptane are based on the value for n-hexane.